Digital-Analog Converter Module

User's Manual

MITSUBISHI

Mitsubishi Programmable Logic Controller

MELSEC-Q

Q62DA
Q64DA
Q68DAV
Q68DAI
GX Configurator-DA (SW0D5C-QDAU-E)

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the PLC system, please read the user's manual of the CPU module to use.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[DESIGN PRECAUTION]

⚠ DANGER

- Do not write data into the "system area" of the buffer memory of intelligent function modules.
  Also, do not use any "prohibited to use" signals as an output signal to an intelligent function module from the PLC CPU.
  Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a PLC system malfunction.

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 100mm(3.9inch) or more from each other.
  Not doing so could result in noise that may cause malfunction.

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[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in the user's manual of the CPU module to use.
  Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base unit while pressing the installation lever located at the bottom of the module downward.
  Improper installation may result in malfunction, breakdown or the module coming loose and dropping.
  Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause damage to the module.
  The system that uses the QnPHCPU allows you to change a module online. Note that there are restrictions on the modules that can be changed online and each module has a predetermined changing procedure. For details, refer to the chapter of online module change in this manual.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Always ground the FG terminal for the PLC.
  There is a risk of electric shock or malfunction.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits or malfunction.
- Be careful not to let foreign matter such as sawdust or wire chips get inside the module.
  They may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring.
  Do not remove this film until the wiring is complete.
  Before operating the system, be sure to remove the film to provide adequate ventilation.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not disassemble or modify the modules.
  Doing so could cause failure, malfunction injury or fire.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause failure or malfunction of the module.
  The system that uses the QnPHCPU allows you to change a module online. Note that there are restrictions on the modules that can be changed online and each module has a predetermined changing procedure. For details, refer to the chapter of online module change in this manual.
- Do not touch the connector while the power is on.
  Doing so may cause malfunction.
- Switch all phases of the external power supply off when cleaning or retightening the terminal screws and module installation screws.
  Not doing so may cause failure or malfunction of the module.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damages to the screws and/or the module, resulting in the module falling out, short circuits or malfunction.
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
  Failure to do so may cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

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REVISIONS

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Print Date	* Manual Number	Revision
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INTRODUCTION

Thank you for purchasing the MELSEC-Q series PLC.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series PLC you have purchased, so as to ensure correct use.
Please forward a copy of this manual to the end user.

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Conformation to the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the CPU module to use.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

About the Generic Terms and Abbreviations

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Abbreviation/general terms	Description of the abbreviation/general terms
D/A converter module	Generic term for Q62DA, Q64DA, Q68DAV Q68DAI
DOS/V personal computer	IBM PC/AT® or compatible computer with DOS/V.
GX Developer	Generic product name of the product types SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV and SWnD5C-GPPW-EVA. "n" in the model name is 4 or greater.
GX Configurator-DA	Generic term for digital-analog converter module setting and monitor tool GX Configurator-DA (SW0D5C-QDAU-E)
QCPU (Q mode)	Generic term for Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU and Q25HCPU
QnPHCPU	Generic term for Q12PHCPU and Q25PHCPU.
Personal computer	Generic term for DOS/V personal computer
Industrial shipment setting	Generic term for analog input ranges 1 to 5V, 0 to 5V, -10 to 10V, 4 to 20mA and 0 to 20mA.

Product Structure

The product structure of this product is given in the table below.

Model code	Product name	Quantity
Q62DA	Q62DA Model Digital-Analog Converter module	1
Q64DA	Q64DA Model Digital-Analog Converter module	1
Q68DAV	Q68DAV Model Digital-Analog Converter module	1
	FG terminal L-Shaped metal fitting	1
Q68DAI	Q68DAI Model Digital-Analog Converter module	1
	FG terminal L-Shaped metal fitting	1
SW0D5C-QDAU-E	GX Configurator-DA Version 1(1-license product) (CD-ROM)	1
SW0D5C-QDAU-EA	GX Configurator-DA Version 1(Multiple-license product) (CD-ROM)	1

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1 OVERVIEW

This User's Manual describes the specifications, handling and programming methods for the Q62DA type digital-analog converter module (hereinafter referred to as the Q62DA), the Q64DA type digital-analog converter module (hereinafter referred to as the Q64DA), the Q68DAV type digital-analog converter module (hereinafter referred to as the Q68DAV) and the Q68DAI type digital-analog converter module (hereinafter referred to as the Q68DAI) which are used in conjunction with MELSEC-Q series CPU module (hereinafter referred to as the PLC CPU).
In this manual, the Q62DA, Q64DA, Q68DAV and Q68DAI are collectively referred to as the D/A (Digital-Analog) converter modules.

1.1 Features

(1) Available models

- Q62DA ····· 2 channels: Voltage or current output can be selected for each channel.
- Q64DA ····· 4 channels: Voltage or current output can be selected for each channel.
- Q68DAV·····8 channels: All of which are voltage output.
- Q68DAI ·····8 channels: All of which are current output.

(2) High-speed conversion processing

Conversion processing is performed at a speed of 80 μ s/channel.

(3) High degree of accuracy

The conversion accuracy is ± 0.1% (When the ambient temperature is 25 ± 5 °C).

(4) Changing the resolution mode

The resolution mode can be changed according to the application, and digital-value resolution settings of 1/4000, 1/12000 or 1/16000 can be selected.

(5) Changing the output range

The output range*1 can easily be changed using GX Developer.

*1 The output range refers to the type of offset/gain settings. The most frequently used range is set as the default but the user can also specify their own offset/gain settings.

(6) Synchronous output function

This function sets a constant time (120 μ s) until the analog value is output after the digital value is written from the PLC CPU. Highly accurate analog control can be achieved by combining this function with a constant cycle execution type program for the PLC CPU or the constant scan function*2.

*2 The constant scan function executes the sequence program within a fixed time interval.

(7) Analog output HOLD/CLEAR function

This function is set to either retain or clear the analog output value when the CPU module is in the STOP status or when a stop error occurs.

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(8) Easy settings using the utility package

A utility package is sold separately (GX Configurator-DA).
The utility package is not a required item. However, it can be used to set initial settings and automatic refresh settings on screen, reduce sequence programs, and check settings and operating status.

1.2 Functions Added to Function Version B and Later

(1) Functions added to function version B D/A converter module

The functions added by the function version B D/A converter module are listed below.

Item	Function overview	Reference section
Multiple PLC system compatibility	Compatible with a Multiple PLC system. A PLC CPU of function version B or later are required.	Section 2.1
Analog output test during PLC CPU STOP	When the CH□ output enable/disable flag is forced ON during PLC CPU STOP, the D/A converted value is output.	Section 3.2.3
Resolution mode	The resolution mode can be changed according to the application, and a resolution setting can be selected from 1/4000, 1/12000 and 1/16000.	Section 3.2
High resolution mode status flag (X8)	This turns ON when in high resolution mode.	Section 3.3

POINT

(1) See Appendix 1.1 for a comparison of functions of the function version.
(2) See Section 2.2 on how to check the function version.

(2) Functions added to function version C D/A converter module

The functions added by the function version C D/A converter module are listed below.

Item	Function overview	Reference section
Online module change	You can change the module without stopping the system. A PLC CPU of function version C or later is required.	Chapter 7
Mode switching that does not require PLC CPU to be reset	Using the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and operation condition setting request (Y9), the module is switched between the normal mode and offset/gain setting mode without the PLC CPU being reset.	Section 3.4.12
	Using the dedicated instruction (G.OFFGAN), the module is switched between the normal mode and offset/gain setting mode without the PLC CPU being reset.	Appendix 3.1
	Using GX Configurator-DA, the module is switched between the normal mode and offset/gain setting mode without the PLC CPU being reset.	Section 5.6.2

2 SYSTEM CONFIGURATION

2.1 Applicable Systems

This section describes the system configuration for the D/A converter module.

(1) Applicable module and the number of modules that can be installed

The following are the CPU module and network module (for remote I/O stations) in which the D/A converter module can be installed and the number of modules that can be installed.

Applicable module		Number of modules that can be installed	Remarks
CPU module	Q00JCPU	Maximum 16	(*1)
	Q00CPU Q01CPU	Maximum 24	
	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	Maximum 64	Can be installed in Q mode only (*1)
	Q12PHCPU Q25PHCPU	Maximum 64	(*1)
Network module	QJ72LP25-25 QJ72BR15 QJ72LP25G QJ71LP25GE	Maximum 64	MELSECNET/H Remote I/O station (*2)

*1 See User's Manual (Function Explanation, Program Fundamentals) for the CPU module to use.
*2 See Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Base unit in which the converter module can be installed

The D/A converter module can be installed in any I/O slot (*3) of the base unit. However, a power shortage may occur depending on the combination with other installed modules and the number of modules used, so always take into consideration the power supply capacity when installing modules.

*3 Limited to the range of the number of I/O points in the CPU module and network module (for remote I/O stations).

(3) Compatibility with a multiple PLC system

First read the QCPU (Q mode) user's manual (Function Explanation, Program Fundamentals) if the D/A converter module is used with a multiple PLC system.

(a) Compatible D/A converter module
Use a D/A converter module with function version B or higher if using the module in a multiple PLC system.

(b) Intelligent function module parameters
Perform PLC write of the intelligent function module parameters to the control PLC of the D/A converter module only.

(4) Compatibility with online module change

To make an online module change, use the module of function version C or later.

POINT
The products of function version C include the functions of the products of function versions A and B.

(5) Software packages supported

Correspondence between systems which use D/A converter modules and software packages are as shown below.

The GX Developer is necessary when using a D/A converter module.

		Software Version	
		GX Developer	GX Configurator-DA ＊4
Q00J/Q00/Q01CPU	Single PLC system	Version 7 or later	Version 1.10L or later (cannot be used with the SW0D5C-QDAU-E 60G or earlier versions).
	Multiple PLC system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single PLC system	Version 4 or later	SW0D5C-QDAU-E 00A or later
	Multiple PLC system	Version 6 or later	SW0D5C-QDAU-E 20C or later
Q12PH/Q25PHCPU	Single PLC system	Version 7.10L or later	Version 1.13P or later (cannot be used with the SW0D5C-QDAU-E 60G or earlier versions).
	Multiple PLC system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	SW0D5C-QDAU-E 50F or later

＊4 Refer to Appendix 1.2 for the combinations of the D/A converter module functions and GX Configurator-DA software versions.
When using the Q68DAV or Q68DAI, use SW0D5C-QDAU-E 60G or later.

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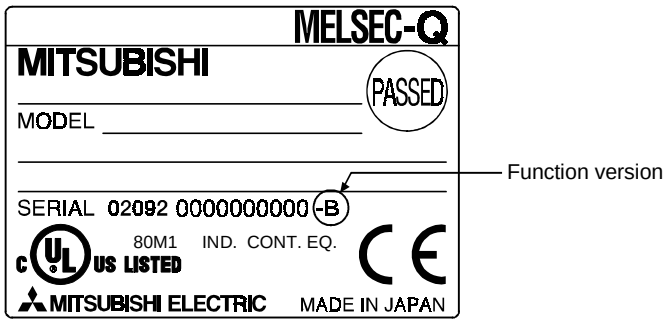
2.2 How to Check the Function Version and Software Version

This section describes how to check the function version of the D/A converter module and the GX Configuration-DA software version.

(1) How to check the function version of the D/A converter module

(a) To check the version using the "SERIAL column of the rating plate" located on the side of the module



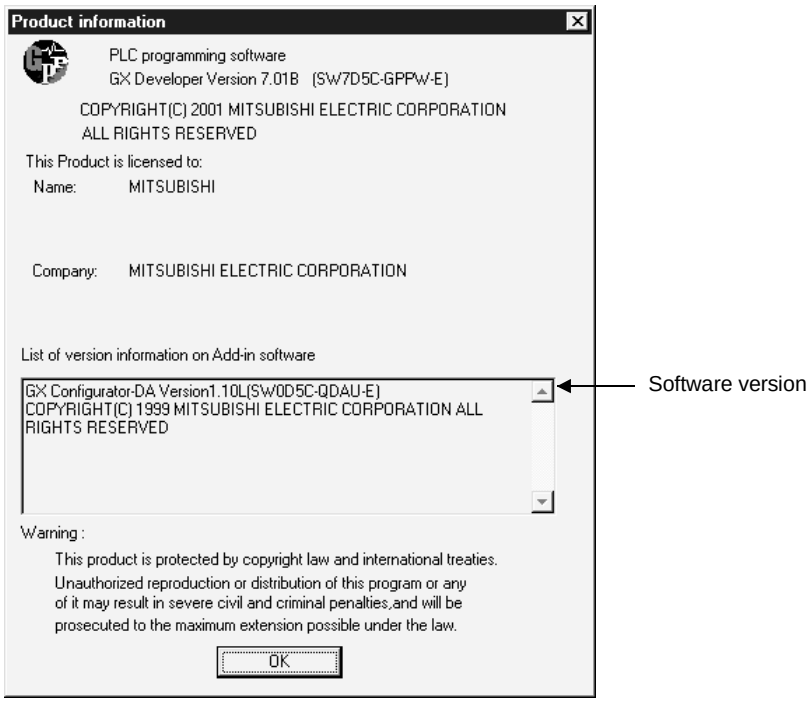
(b) To check the version using the GX Developer
See Section 8.2.4 of this manual.

(2) How to check the GX Configuration-DA software version

The GX Configuration-DA software version can be checked in GX Developer's "Product information" screen.

[Startup procedure]

GX Developer → "Help" → Product information



(In the case of GX Developer Version 7)

REMARK

The version indication for the GX Configurator-DA has been changed as shown below from the SW0D5C-QDAU-E 60G upgrade product.

Previous product		Upgrade and subsequent versions
SW0D5C-QDAU-E 60G	→	GX Configurator-DA Version 1.10L

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3 SPECIFICATIONS

3.1 Performance Specifications

3.1.1 Performance specifications list

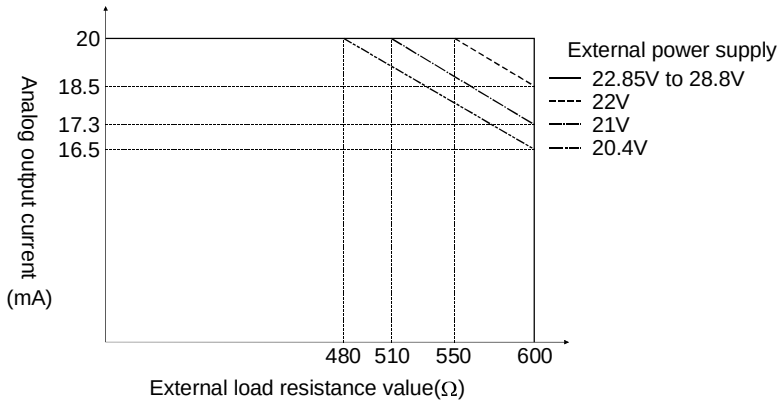
Table 3.1 Performance specifications list

Item \ Model name		Q62DA	Q64DA	Q68DAV	Q68DAI
Number of analog output points		2 points (2 channels)	4 points (4 channels)	8 points (8 channels)	
Digital input		16-bit signed binary (normal resolution mode: -4096 to 4095, high resolution mode: -12288 to 12287, -16384 to 16383)			
Analog output	Voltage	–10 to 10 V DC (External load resistance value: 1 kΩ to 1MΩ)			—
	Current	0 to 20 mA DC (External load resistance value: *)		—	0 to 20 mA DC (External load resistance value: *)
I/O characteristics, Maximum resolution					

Analog output range		Normal resolution mode		High resolution mode	
		Digital input value	Maximum resolution	Digital input value	Maximum resolution
Voltage	0 to 5V	0 to 4000	1.25 mV	0 to 12000	0.416 mV
	1 to 5V		1.0 mV		0.333 mV
	-10 to 10V	-4000 to 4000	2.5 mV	-16000 to 16000	0.625 mV
	User range setting		0.75 mV	-12000 to 12000	0.333 mV
Current	0 to 20 mA	0 to 4000	5 μA	0 to 12000	1.66 μA
	4 to 20 mA		4 μA		1.33 μA
	User range setting	-4000 to 4000	1.5 μA	-12000 to 12000	0.83 μA

Accuracy (Accuracy in respect to maximum analog output value)	Ambient temperature 25 ± 5 °C	Within ± 0.1 % (Voltage: ±10 mV, Current: ± 20 μA)			
	Ambient temperature 0 to 55 °C	Within ± 0.3 % (Voltage: ± 30 mV, Current: ± 60 μA)			
Conversion speed		80 μs/channel			
Absolute maximum output	Voltage	± 12 V			—
	Current	21 mA		—	21 mA
E^2PROM write count		Max. 100 thousand times			
Output short circuit protection		Available			
Insulation method		Between the I/O terminal and PLC power supply : Photo coupler insulation Between output channels : No insulation Between external supply power and analog output : No insulation			
Dielectric withstand voltage		Between the I/O terminal and PLC power supply: 500VAC for 1 minute			
Insulation resistance		Between the I/O terminal and PLC power supply: 500VDC 20MΩ or more			
Number of occupied points		16 points			
Connected terminals		18-points terminal block			
Applicable wire size		0.3 to 0.75 mm^2			
Applicable solderless terminal		R 1.25-3 (A solderless terminal with sleeve cannot be used)		FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A Other terminals than FG: R1.25-3 (A solderless terminal with sleeve cannot be used)	
External supply power		24 V DC + 20 %, – 15 %			
		Ripple, spike 500 mV P-P or less			
		Inrush current: 1.9 A, within 300 μs	Inrush current: 3.1 A, within 300 μs	Inrush current: 3.3 A, within 70 μs	Inrush current: 3.1 A, within 75 μs
		0.12 A	0.18 A	0.19 A	0.28 A
Internal current consumption (5 V DC)		0.33 A	0.34 A	0.39 A	0.38 A
Weight		0.19 kg		0.18 kg	

* When the voltage of the external power supply is less than 22.85V DC, the analog output current and the external load resistance value are as follows.



REMARK

See the user's manual for the CPU module being used for the general specifications for the D/A converter module.

3.1.2 I/O conversion characteristics

I/O conversion characteristics are used for converting the digital value written from the PLC CPU to an analog output value (voltage or current output), and represented by inclined straight lines when offset and gain values are included.

Offset value

The offset value becomes the analog output value (voltage or current) when the digital input value set from the PLC CPU is 0.

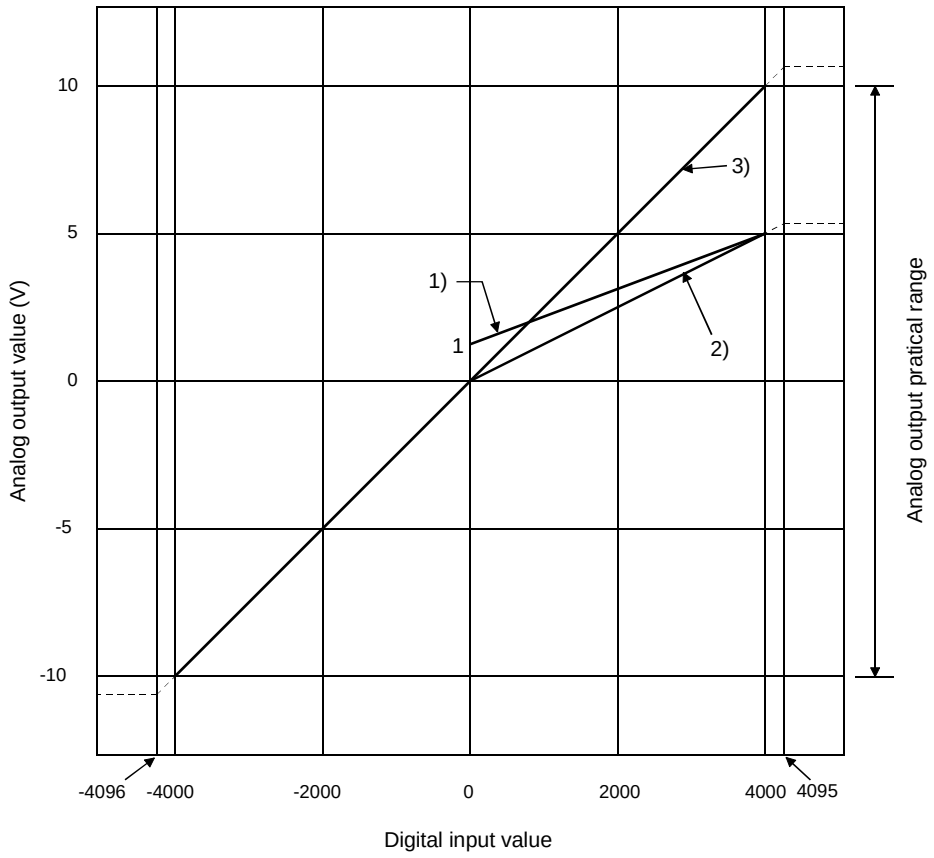
Gain value

The gain value denotes the analog output value (voltage or current) when the digital input value set from the PLC CPU is
4000 (in normal resolution mode),
12000 (when 1 to 5V, 0 to 5V, 4 to 20 mA, 0 to 20 mA or the user range setting is selected in high resolution mode),
16000 (when -10 to 10V is selected in high resolution mode).

(1) Voltage output characteristic

(a) Voltage output characteristic in normal resolution mode

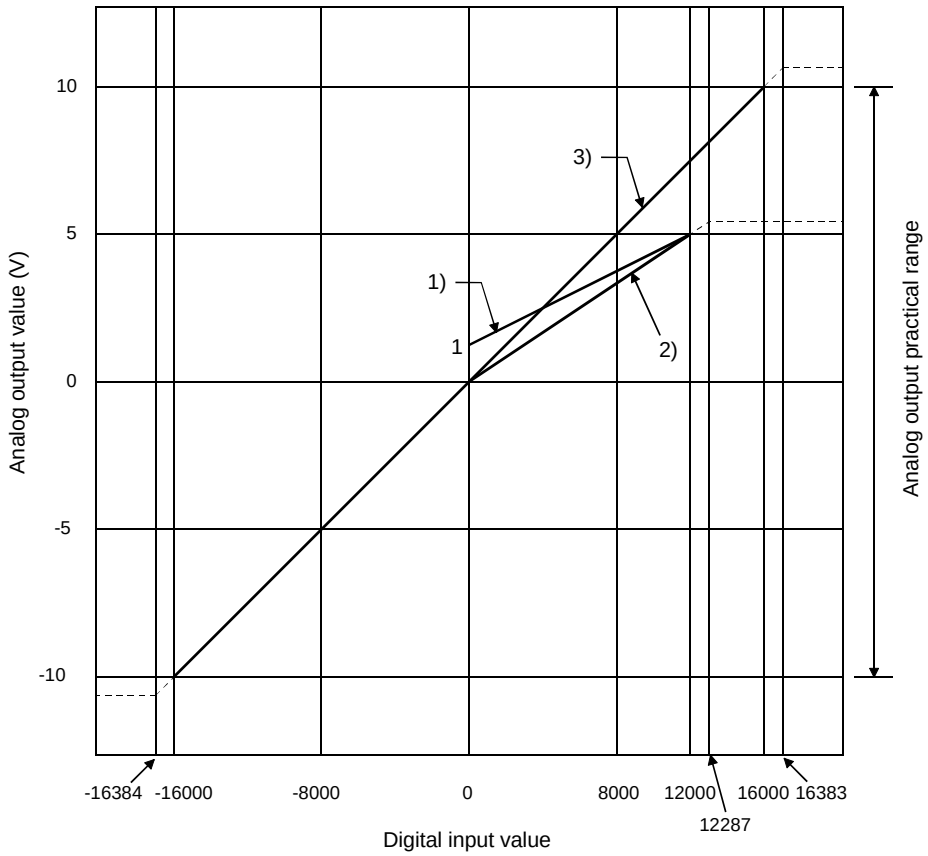
Figure 3.1 shows a graph of the voltage output characteristic in normal resolution mode.



Number	Output value range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	1 to 5 V	1 V	5 V	0 to 4000	1.0 mV
2)	0 to 5 V	0 V	5 V		1.25 mV
3)	–10 to 10 V	0 V	10 V	–4000 to 4000	2.5 mV
—	User range setting	*1	*1	–4000 to 4000	0.75 mV

Figure 3.1 Voltage output characteristic in normal resolution mode

(b) Voltage output characteristic in high resolution mode
Figure 3.2 shows a graph of the voltage output characteristic in high resolution mode.



Number	Output value range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	1 to 5 V	1 V	5 V	0 to 12000	0.333 mV
2)	0 to 5 V	0 V	5 V		0.416 mV
3)	–10 to 10 V	0 V	10 V	–16000 to 16000	0.625 mV
—	User range setting	∗1	∗1	–12000 to 12000	0.333 mV

Figure 3.2 Voltage output characteristic in high resolution mode

POINT

(1) Set within the digital input range and analog output range for each output range.
If these ranges are exceeded, the maximum resolution and accuracy may not fall within the performance specifications. (Avoid using the dotted line area shown in Figures 3.1 and 3.2.)

(2) Set the offset/gain values for the user setting range ✻1 within a range in which the following conditions are satisfied.

(a) Setting range is from –10 to 10 V.

(b) { (Gain value) – (Offset value) } > A

<Value of A>

Normal resolution mode	High resolution mode
3.0 V	4.0 V

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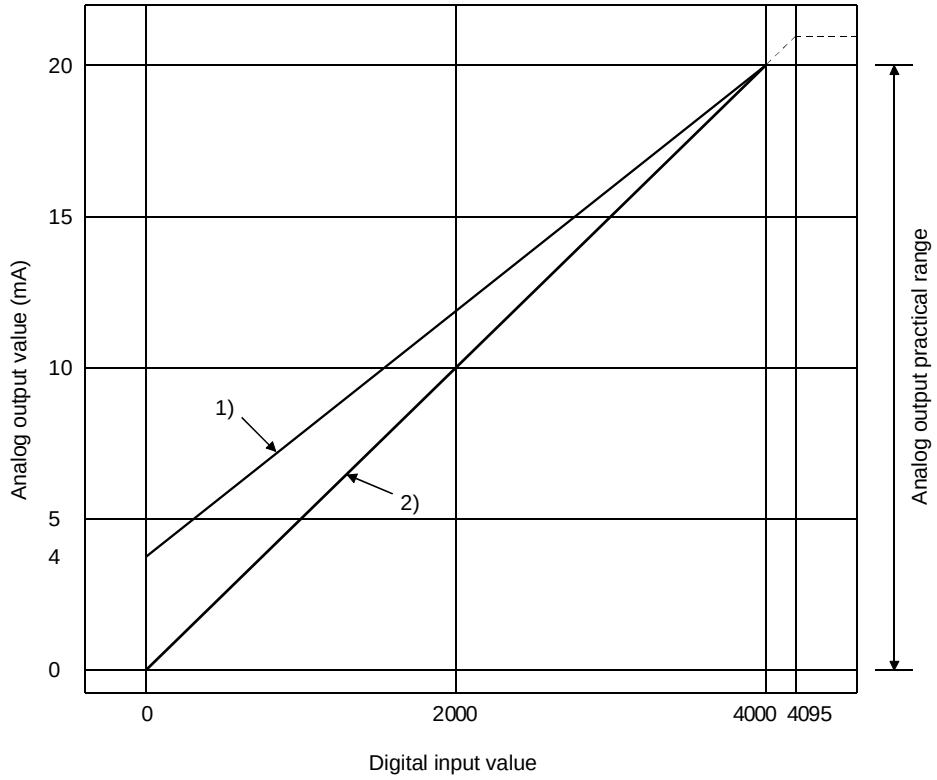
(2) Current output characteristic

(a) Current output characteristic in normal resolution mode

Figure 3.3 shows a graph of the current output characteristic in normal resolution mode.



Number	Output value range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	4 to 20 mA	4 mA	20 mA	0 to 4000	4 μA
2)	0 to 20 mA	0 mA	20 mA		5 μA
—	User range setting	*1	*1	–4000 to 4000	1.5 μA

Figure 3.3 Current output characteristic in normal resolution mode

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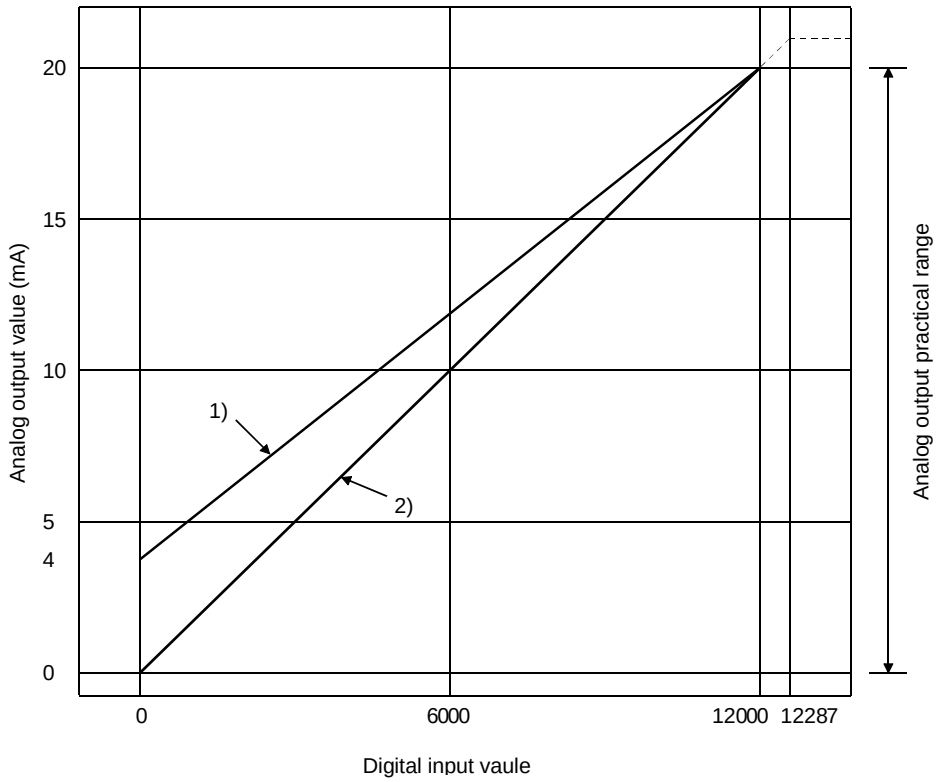
(b) Current output characteristic in high resolution mode
Figure 3.4 shows a graph of the current output characteristic in high resolution mode.



Number	Output value range setting	Offset value	Gain value	Digital input value	Maximum resolution
1)	4 to 20 mA	4 mA	20 mA	0 to 12000	1.66 μ A
2)	0 to 20 mA	0 mA	20 mA		1.33 μ A
—	User range setting	*1	*1	–12000 to 12000	0.83 μ A

Figure 3.4 Current output characteristic in high resolution mode

POINT

(1) Set within the digital input range and analog output range for each output range.
If these ranges are exceeded, the maximum resolution and accuracy may not fall within the performance specifications. (Avoid using the dotted line area shown in Figures 3.3 and 3.4.)

(2) Set the offset/gain values for the user setting range ✻1 within a range in which the following conditions are satisfied.

(a) Setting range is from 0 to 20 mA

(b) { (Gain value) – (Offset value) } > A

<Value of A>

Normal resolution mode	High resolution mode
6.0 mA	10.0 mA

3.1.3 Accuracy

Accuracy is represented with respect to the maximum analog output value.
Accuracy does not change and remains within the range listed in the performance specification even if the output characteristic is changed by changing offset/gain settings, output range and resolution mode.
Figure 3.5 shows the range of fluctuation in accuracy when a -10 to 10V range is selected and in normal resolution mode.
Accuracy for the analog output is within ± 0.1% (± 10 mV) when the ambient temperature is 25 ± 5 °C and within ± 0.3% (± 30 mV) when the ambient temperature is 0 to 55°C.

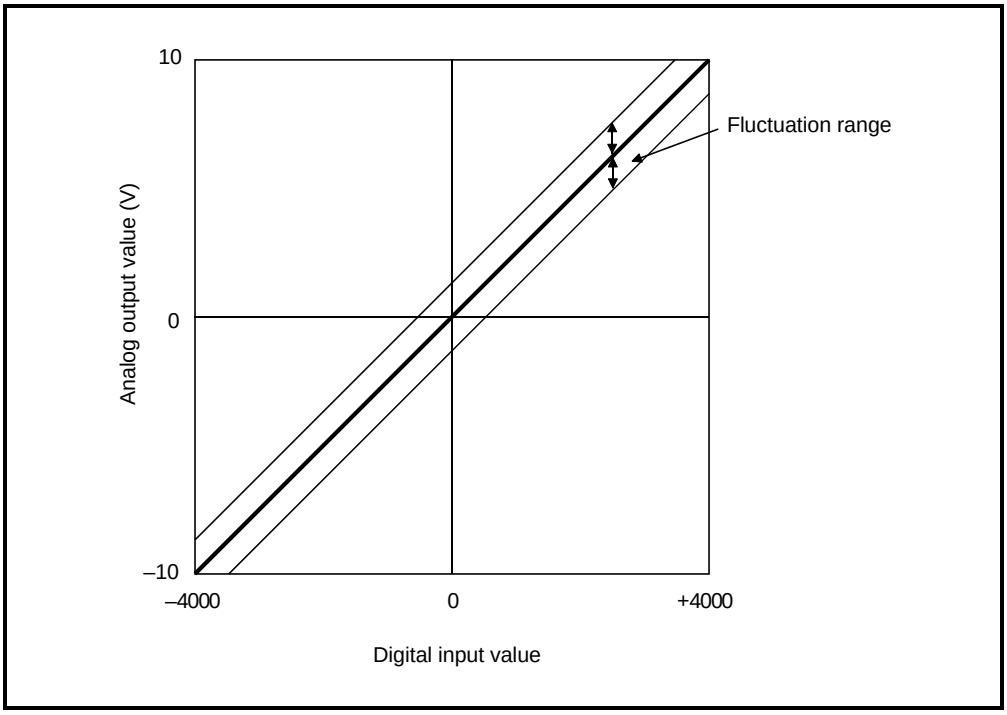


Figure 3.5 Accuracy

3.1.4 Conversion speed

The conversion speed per channel for the Q62DA, Q64DA, Q68DAV and Q68DAI is "80 μ s $\times$ the number of conversion enabled channels".
By setting the unused channels to D/A conversion disabled in buffer memory address 0 (Un\G0), the conversion speed can be increased.

3.2 D/A Converter Module Function

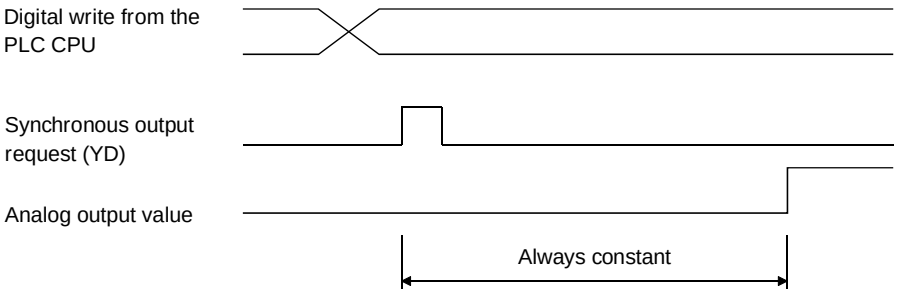
Table 3.2 shows the function of the D/A converter modules.

Table 3.2 Function list

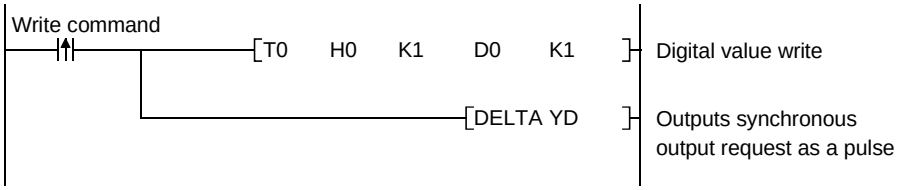
Item	Function	Reference section
D/A conversion enable/disable function	(1) Specifies whether to enable or disable the D/A conversion for each channel. (2) By disabling the D/A conversion for the channels that are not used, the conversion speed can be shortened.	Section 3.4.4
D/A output enable/disable function	(1) Specifies whether to output the D/A converted value or the offset value for each channel. (2) The conversion speed stays constant regardless of whether D/A output is enabled or disabled.	Section 3.3.1
Synchronous output function	(1) An analog output synchronized with the PLC CPU can be obtained.	Section 3.2.1
Analog output HOLD/CLEAR function	(1) The output analog value can be retained when the PLC CPU module is placed in the STOP status or when an error occurs.	Section 3.2.2
Analog output test during PLC CPU STOP	(1) When the CH□ output enable/disable flag is forced ON during PLC CPU STOP, the D/A converted analog value is output.	Section 3.2.3
Resolution mode	(1) The resolution mode can be changed according to the application, and a resolution setting can be selected from 1/4000, 1/12000 and 1/16000. (2) The resolution mode setting is applicable to all channels. (3) See Section 3.1.1 for the digital input values and maximum resolution in normal resolution mode and high resolution mode.	Section 3.1.1 Section 4.5
Online module change	(1) A module change is made without the system being stopped.	Chapter 7

3.2.1 Synchronous output function

An analog output that is synchronized with the PLC CPU can be obtained.
The analog output will be updated after the synchronous output request (YD) is set to ON and the time specified as "PLC CPU processing time + 120 μ s" has elapsed.
However, the analog output will be fixed to CH1, and other channels (CH2 to CH8) cannot be used.



<Program example>



3.2.2 Analog output HOLD/CLEAR function

Whether the output analog value will be retained or cleared according to the PLC CPU operating status (RUN, STOP, and Stop error) can be set using the intelligent function module switch (see Section 4.5).
Table 3.3 lists available analog output status based on the combinations of D/A conversion enable/disable and CH□ output enable/disable.
Perform settings according to the system application.

Table 3.3 Analog output status combination list

Setting combination execution status	D/A conversion enable/disable Setting (buffer memory address 0: Un\G0)	Enable		Disable	
	CH□ output enable/disable flags (Y1 to Y8)	Enable		Disable	Enable or disable
	HOLD/CLEAR setting	HOLD	CLEAR	HOLD or CLEAR	HOLD or CLEAR
Analog output status when PLC CPU is running		Outputs the analog value of the D/A converted digital value.		Offset	0 V/0 mA
Analog output status when PLC CPU is stopped		Hold	Offset	Offset	0 V/0 mA
Analog output status when a PLC CPU stop error occurs		Hold	Offset	Offset	0 V/0 mA
Analog output status when a watchdog timer *1 error occurs in Q64DA, Q62DA, Q68DAV or Q68DAI		0 V/0 mA	0 V/0 mA	0 V/0 mA	0 V/0 mA

*1 This occurs when program operations are not completed within the scheduled time due to a hardware problem of the D/A converter module. When a watchdog timer error occurs, module READY (X0) turns OFF and the D/A converter module RUN LED turns off.

POINT

Design the system so that the D/A conversion enable/disable setting (buffer memory address 0: Un\G0) changes to "Enable" after the external power (see Section 4.3) is supplied.
Analog output may not properly be performed if the external power is not at the specified voltage.

3.2.3 Analog output test during PLC CPU STOP

When the PLC CPU stops, an analog output test as shown in Table 3.4 can be performed.
The analog output test performs the following operations in GX Developer device testing or GX Configurator-DA selection testing described in Section 5.6.1.

(1) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) of the channel to be tested to enable.

(2) Turn Operating condition setting request (Y9) from OFF to ON. (Refer to Section 3.3.2)

(3) Sets the output enable/disable flag (Y1 to Y8) for the channel to be tested to enable (OFF → ON).

(4) Writes a digital value equivalent to the analog value to be output in CH□ digital value (see Table 3.6 in Section 3.4.1) in the buffer memory.
This function is performed with the D/A converter module of function version B or later.

Table 3.4 List of analog output test

Setting combination	D/A conversion enable/disable Setting (Un\G0)	Enable		Disable	
	CH□ output enable/disable flags (Y1 to Y8)	Enable	Disable	Enable	disable
Analog output test		Allowed	Not allowed	Not allowed ＊1	

＊1 Perform the analog output test after changing the D/A conversion enable/disable setting (buffer memory address 0: Un\G0) to enable.

POINT

When the digital value storage device has been set in the automatic refresh setting of GX Configurator-DA, the buffer memory is overwritten since automatic refresh is performed if the PLC CPU is during STOP.
In this case, write a digital value to the digital value storage device instead of the buffer memory.

3.3 I/O Signals for the PLC CPU

3.3.1 List of I/O signals

Table 3.5 shows a list of the I/O signals for the D/A converter modules.
The following explanation is mentioned based on the Q68DAV and Q68DAI with 8-channel analog output (CH.1 to CH.8).
Note that I/O numbers (X/Y) shown in this chapter and thereafter are the values when the start I/O number for the D/A converter module is set to 0.

Table 3.5 List of I/O signal

Signal direction	D/A converter module → CPU module	Signal direction	CPU module ← D/A converter module
Device No	Signal name	Device No.	Signal name
X0	Module READY	Y0	Use prohibited ＊1
X1	Use prohibited ＊1	Y1	CH1 Output enable/disable flag
X2		Y2	CH2 Output enable/disable flag
X3		Y3 ＊2	CH3 Output enable/disable flag
X4		Y4 ＊2	CH4 Output enable/disable flag
X5		Y5 ＊2	CH5 Output enable/disable flag
X6		Y6 ＊2	CH6 Output enable/disable flag
X7		Y7 ＊2	CH7 Output enable/disable flag
X8	High resolution mode status flag	Y8 ＊2	CH8 Output enable/disable flag
X9	Operating condition setting completed flag	Y9	Operating condition setting request
XA	Offset/gain setting mode flag	YA	User range writing request
XB	Channel change completed flag	YB	Channel change request
XC	Set value change completed flag	YC	Set value change request
XD	Synchronous output mode flag	YD	Synchronous output request
XE	Use prohibited ＊1	YE	Use prohibited ＊1
XF	Error flag	YF	Error clear request

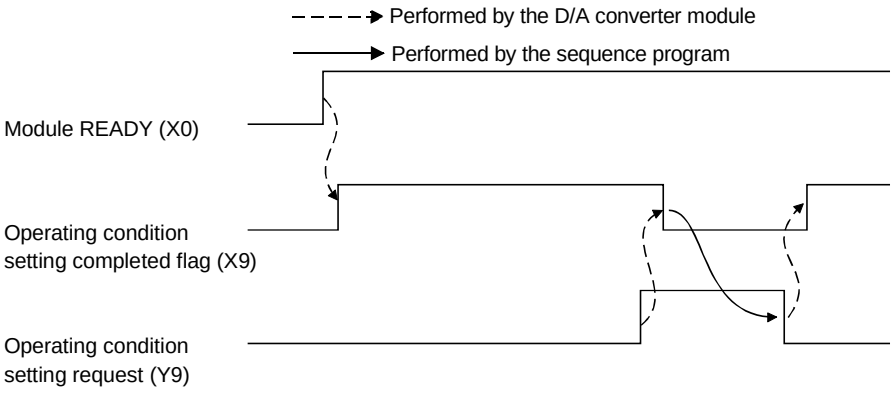
POINT

＊1 These signals cannot be used by the user since they are used by the system. If these are turned ON/OFF by the sequence program, the functioning of the D/A converter module cannot be guaranteed.
＊2 For Q62DA, Y3 to Y8 cannot be used.
For Q64DA, Y5 to Y8 cannot be used.

3.3.2 Details of I/O signals

I/O signals for the D/A converter module are explained in detail below.

(1) Input signals

Device No.	Signal name	Description
X0	Module READY	(1) When the PLC CPU is powered on or reset, this signal turns on once the preparation for D/A conversion has been completed, and D/A conversion processing is then performed. (2) When the Module READY (X0) signal is off, D/A conversion processing is not performed. Module READY (X0) turns off in the following situations: • During offset/gain setting mode • When the D/A converter module has a watchdog timer error
X8	High resolution mode status flag	(1) This turns ON when in high resolution mode.
X9	Operating condition setting completed flag	(1) This is used as an interlock condition for turning the operating condition setting request (Y9) ON/OFF when the setting for D/A conversion enable/disable (buffer memory address 0: Un\G0) is changed. (2) Under the following conditions, the operating condition setting completed flag (X9) turns OFF. • When Module READY (X0) is OFF • When operating condition setting request (Y9) is ON 

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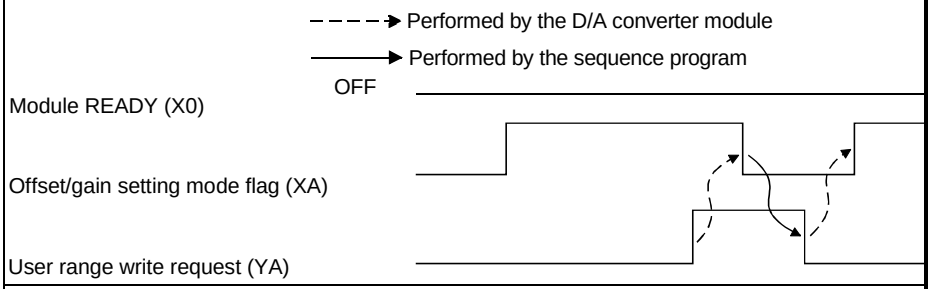
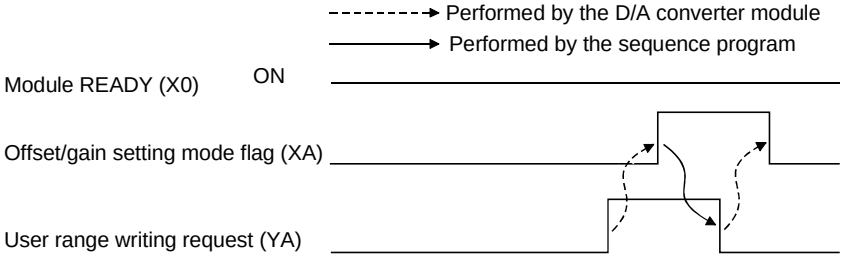
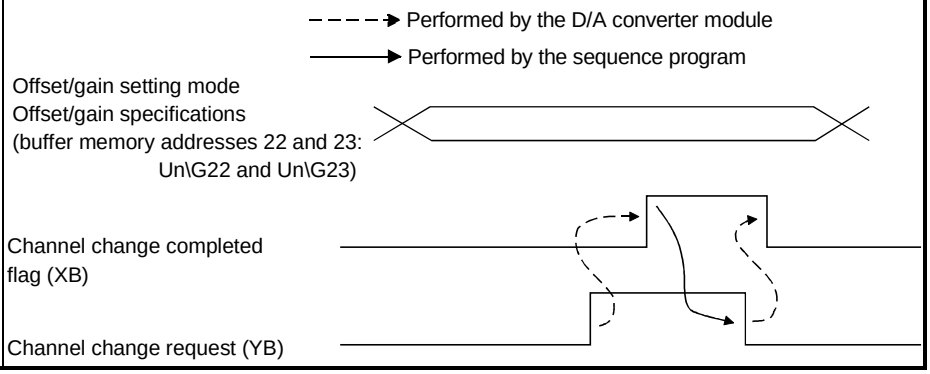
<table>
<tr><th>Device No.</th><th>Signal name</th><th>Description</th></tr>
<tr><td rowspan="2">XA</td><td rowspan="2">Offset/gain setting mode flag</td><td>[In offset/gain setting mode]
(1) This is used as an interlock condition for setting the user range write request (YA) to ON/OFF when registering the value after adjustment of the offset/gain settings have been completed.
(2) See Section 4.6 regarding the offset/gain settings.
  </td></tr>
<tr><td>[In normal mode]
(1) This is signal is used as an interlock condition to run ON/OFF the User range writing request (YA) when the user range is restored.
(2) See Chapter 7 regarding the user range restoration.
  </td></tr>
<tr><td>XB</td><td>Channel change completed flag</td><td>(1) This is used as an interlock condition for setting the channel change request (YB) to ON/OFF when changing the channel for which the offset/gain settings are to be performed.
(2) See Section 4.6 regarding the offset/gain settings.
  </td></tr>
</table>

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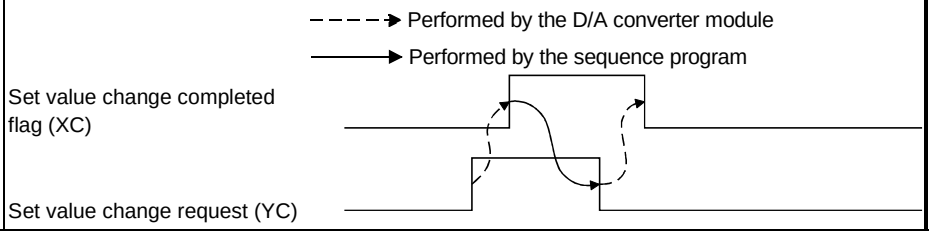
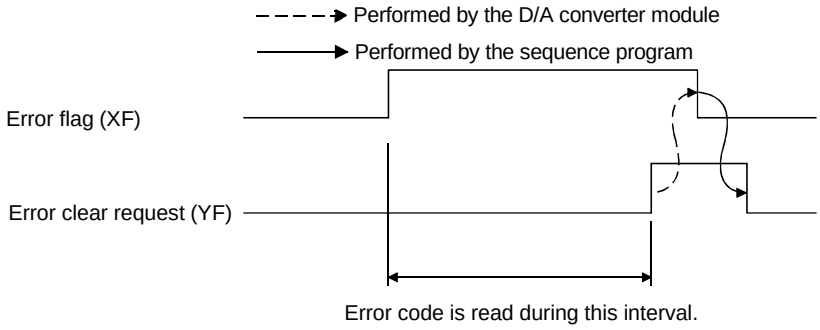
Device No.	Signal name	Description
XC	Set value change completed flag	(1) This is used as an interlock condition for setting the set value change request (YC) to ON/OFF when adjusting the offset/gain settings. (2) See Section 4.6 regarding the offset and gain settings. 
XD	Synchronous output mode flag	This flag turns ON when the system is set to the synchronous output mode.
XF	Error flag	(1) The error flag turns ON when a write error occurs. (2) To turn the error flag (XF) OFF, remove the cause of the error and set the error clear request (YF) to ON. The error code (buffer memory address 19: Un\G19) changes to 0 and the ERROR LED turns off. 

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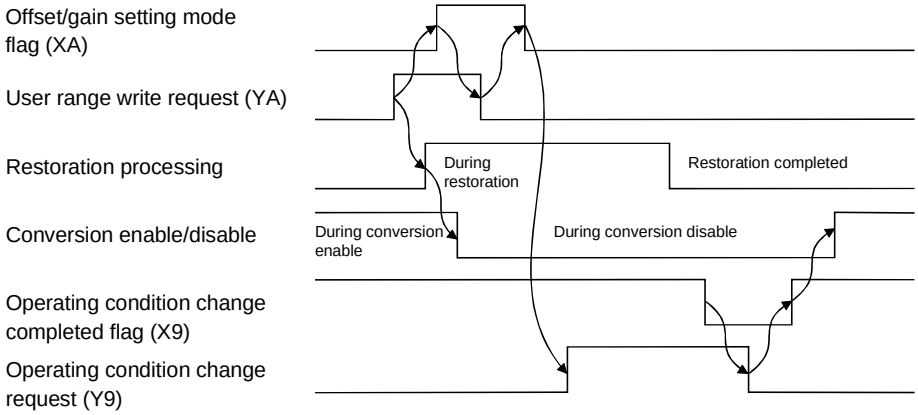
(2) Output signals

Device No.	Signal name	Description
Y1 to Y8	CH□ output enable/disable flag	(1) Specifies whether to output the D/A converted value or offset value for each channel. ON: D/A converted value OFF: Offset value (2) The D/A conversion speed is constant regardless of whether the output enable/disable flag is ON or OFF.
Y9	Operating condition setting request	(1) This turns ON when the contents of the D/A conversion enable/disable setting are validated. (2) See the X9 column for the ON/OFF timing.
YA	User range write request	[In offset/gain setting mode] (1) This turns ON when the values for the adjusted offset/gain settings are registered in the D/A converter module. (2) See the XA column for ON/OFF timing. See Section 4.6 for offset/gain settings.
		[In normal mode] (1) Turn ON this signal when restoring the user range. (2) See the XA column for the ON/OFF timing. See Chapter 7 for the user range restoration.
YB	Channel change request	(1) This turns ON when changing the channel for which offset/gain settings are to be performed. (2) See the XB column for the ON/OFF timing.
YC	Set value change request	(1) This turns ON/OFF when increasing or decreasing the analog output value during adjustment of the offset/gain settings. (2) The analog output is either increased or decreased based on the value that was set in buffer memory address 24 (Un\G24).
YD	Synchronous output request	(1) While in the synchronous output mode, D/A conversion is performed and the analog value is output at the timing when the synchronous output request (YD) is set to ON.
YF	Error clear request	(1) This turns ON when a write error is cleared. (2) See the XF column for ON/OFF timing.

POINT

When the user range write request (YA) is turned ON with D/A conversion enabled in the normal mode, the D/A converter module restores the user range.



During restoration: D/A conversion disable
After restoration : D/A conversion processing can be executed in the restored user range

3.4 Buffer Memory

The explanation in Section 3.4.5 and later is based on the 8-channel analog output (CH. 1 to CH. 8) Q68DAV/Q68DAI.

3.4.1 Buffer memory assignment (Q62DA)

This section describes the assignment of the Q62DA buffer memory.

Table 3.6 Buffer memory assignment (Q62DA)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable	3H	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H	3	System area	—	—
to	to			
AH	10			
BH	11	CH1 Set value code	0	R
CH	12	CH2 Set value code	0	R
DH	13	System area	—	—
to	to			
12H	18			
13H	19	Error code	0	R/W
14H	20	Setting range (CH1 to CH4)	0H	R
15H	21	System area	—	—
16H	22	Offset/gain setting mode Offset specification	0	R/W
17H	23	Offset/gain setting mode Gain specification	0	R/W
18H	24	Offset/gain adjustment value specification	0	R/W
19H	25	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	0	R/W
9FH	159		0	R/W
A0H	160	System area	—	—
to	to			
C7H	199			
C8H	200	Pass data classification setting ＊3	0	R/W
C9H	201	System area	—	—
CAH	202	CH1 Industrial shipment settings offset value ＊3	0	R/W
CBH	203	CH1 Industrial shipment settings gain value ＊3	0	R/W
CCH	204	CH2 Industrial shipment settings offset value ＊3	0	R/W
CDH	205	CH2 Industrial shipment settings gain value ＊3	0	R/W
CEH	206	CH1 User range settings offset value ＊3	0	R/W
CFH	207	CH1 User range settings gain value ＊3	0	R/W
D0H	208	CH2 User range settings offset value ＊3	0	R/W
D1H	209	CH2 User range settings gain value ＊3	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled
＊3 Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

3.4.2 Buffer memory assignment (Q64DA)

This section describes the assignment of the Q64DA buffer memory.

Table 3.7 Buffer memory assignment (Q64DA)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable	FH	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H	3	CH3 Digital value	0	R/W
4H	4	CH4 Digital value	0	R/W
5H	5	System area	—	—
to	to			
AH	10			
BH	11	CH1 Set value check code	0	R
CH	12	CH2 Set value check code	0	R
DH	13	CH3 Set value check code	0	R
EH	14	CH4 Set value check code	0	R
FH	15	System area	—	—
to	to			
12H	18			
13H	19	Error code	0	R/W
14H	20	Setting range (CH1 to CH4)	0H	R
15H	21	System area	—	—
16H	22	Offset/gain setting mode Offset specification	0	R/W
17H	23	Offset/gain setting mode Gain specification	0	R/W
18H	24	Offset/gain adjustment value specification	0	R/W
19H	25	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	0	R/W
9FH	159		0	R/W
A0H	160	System area	—	—
to	to			
C7H	199			
C8H	200	Pass data classification setting ＊3	0	R/W
C9H	201	System area	—	—
CAH	202	CH1 Industrial shipment settings offset value ＊3	0	R/W
CBH	203	CH1 Industrial shipment settings gain value ＊3	0	R/W
CCH	204	CH2 Industrial shipment settings offset value ＊3	0	R/W
CDH	205	CH2 Industrial shipment settings gain value ＊3	0	R/W
CEH	206	CH3 Industrial shipment settings offset value ＊3	0	R/W
CFH	207	CH3 Industrial shipment settings gain value ＊3	0	R/W
D0H	208	CH4 Industrial shipment settings offset value ＊3	0	R/W
D1H	209	CH4 Industrial shipment settings gain value ＊3	0	R/W
D2H	210	CH1 User range settings offset value ＊3	0	R/W
D3H	211	CH1 User range settings gain value ＊3	0	R/W
D4H	212	CH2 User range settings offset value ＊3	0	R/W
D5H	213	CH2 User range settings gain value ＊3	0	R/W
D6H	214	CH3 User range settings offset value ＊3	0	R/W
E7H	215	CH3 User range settings gain value ＊3	0	R/W
E8H	216	CH4 User range settings offset value ＊3	0	R/W
E9H	217	CH4 User range settings gain value ＊3	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled
＊3 Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

3.4.3 Buffer memory assignment (Q68DAV)

This section describes the assignment of the Q68DA buffer memory.

Table 3.8 Buffer memory assignment (Q68DAV) (1/2)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable	FFH	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H	3	CH3 Digital value	0	R/W
4H	4	CH4 Digital value	0	R/W
5H	5	CH5 Digital value	0	R/W
6H	6	CH6 Digital value	0	R/W
7H	7	CH7 Digital value	0	R/W
8H	8	CH8 Digital value	0	R/W
9H	9	System area	—	—
AH	10		—	—
BH	11	CH1 Set value check code	0	R
CH	12	CH2 Set value check code	0	R
DH	13	CH3 Set value check code	0	R
EH	14	CH4 Set value check code	0	R
FH	15	CH5 Set value check code	0	R
10H	16	CH6 Set value check code	0	R
11H	17	CH7 Set value check code	0	R
12H	18	CH8 Set value check code	0	R
13H	19	Error code	0	R/W
14H	20	Setting range (CH1 to CH4)	0H	R
15H	21	Setting range (CH5 to CH8)	0H	R
16H	22	Offset/gain setting mode Offset specification	0	R/W
17H	23	Offset/gain setting mode Gain specification	0	R/W
18H	24	Offset/gain adjustment value specification	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled

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Table 3.8 Buffer memory assignment (Q68DAV) (2/2)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
19H	25	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	0	R/W
9FH	159		0	R/W
A0H	160	System area	—	—
to	to			
C9H	201			
CAH	202	CH1 Industrial shipment settings offset value ＊3	0	R/W
CBH	203	CH1 Industrial shipment settings gain value ＊3	0	R/W
CCH	204	CH2 Industrial shipment settings offset value ＊3	0	R/W
CDH	205	CH2 Industrial shipment settings gain value ＊3	0	R/W
CEH	206	CH3 Industrial shipment settings offset value ＊3	0	R/W
CFH	207	CH3 Industrial shipment settings gain value ＊3	0	R/W
D0H	208	CH4 Industrial shipment settings offset value ＊3	0	R/W
D1H	209	CH4 Industrial shipment settings gain value ＊3	0	R/W
D2H	210	CH5 Industrial shipment settings offset value ＊3	0	R/W
D3H	211	CH5 Industrial shipment settings gain value ＊3	0	R/W
D4H	212	CH6 Industrial shipment settings offset value ＊3	0	R/W
D5H	213	CH6 Industrial shipment settings gain value ＊3	0	R/W
D6H	214	CH7 Industrial shipment settings offset value ＊3	0	R/W
E7H	215	CH7 Industrial shipment settings gain value ＊3	0	R/W
E8H	216	CH8 Industrial shipment settings offset value ＊3	0	R/W
E9H	217	CH8 Industrial shipment settings gain value ＊3	0	R/W
EAH	218	CH1 User range settings offset value ＊3	0	R/W
EBH	219	CH1 User range settings gain value ＊3	0	R/W
ECH	220	CH2 User range settings offset value ＊3	0	R/W
EDH	221	CH2 User range settings gain value ＊3	0	R/W
EEH	222	CH3 User range settings offset value ＊3	0	R/W
EFH	223	CH3 User range settings gain value ＊3	0	R/W
F0H	224	CH4 User range settings offset value ＊3	0	R/W
F1H	225	CH4 User range settings gain value ＊3	0	R/W
F2H	226	CH5 User range settings offset value ＊3	0	R/W
F3H	227	CH5 User range settings gain value ＊3	0	R/W
F4H	228	CH6 User range settings offset value ＊3	0	R/W
F5H	229	CH6 User range settings gain value ＊3	0	R/W
F6H	230	CH7 User range settings offset value ＊3	0	R/W
F7H	231	CH7 User range settings gain value ＊3	0	R/W
F8H	232	CH8 User range settings offset value ＊3	0	R/W
F9H	233	CH8 User range settings gain value ＊3	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled
＊3 Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

3.4.4 Buffer memory assignment (Q68DAI)

The following explanation is mentioned based on Q68DAV and Q68DAI with 8-channel analog output (CH1 to CH8).

Table 3.9 Buffer memory assignment (Q68DAI) (1/2)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
0H	0	D/A conversion enable/disable	FFH	R/W
1H	1	CH1 Digital value	0	R/W
2H	2	CH2 Digital value	0	R/W
3H	3	CH3 Digital value	0	R/W
4H	4	CH4 Digital value	0	R/W
5H	5	CH5 Digital value	0	R/W
6H	6	CH6 Digital value	0	R/W
7H	7	CH7 Digital value	0	R/W
8H	8	CH8 Digital value	0	R/W
9H	9	System area	—	—
AH	10		—	—
BH	11	CH1 Set value check code	0	R
CH	12	CH2 Set value check code	0	R
DH	13	CH3 Set value check code	0	R
EH	14	CH4 Set value check code	0	R
FH	15	CH5 Set value check code	0	R
10H	16	CH6 Set value check code	0	R
11H	17	CH7 Set value check code	0	R
12H	18	CH8 Set value check code	0	R
13H	19	Error code	0	R/W
14H	20	Setting range (CH1 to CH4)	2222H	R
15H	21	Setting range (CH5 to CH8)	2222H	R
16H	22	Offset/gain setting mode Offset specification	0	R/W
17H	23	Offset/gain setting mode Gain specification	0	R/W
18H	24	Offset/gain adjustment value specification	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled

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Table 3.9 Buffer memory assignment (Q68DAI) (2/2)

Address		Description	Default ＊1	Read/write ＊2
Hexadecimal	Decimal			
19H	25	System area	—	—
to	to			
9DH	157			
9EH	158	Mode switching setting	0	R/W
9FH	159		0	R/W
A0H	160	System area	—	—
to	to			
C9H	201			
CAH	202	CH1 Industrial shipment settings offset value ＊3	0	R/W
CBH	203	CH1 Industrial shipment settings gain value ＊3	0	R/W
CCH	204	CH2 Industrial shipment settings offset value ＊3	0	R/W
CDH	205	CH2 Industrial shipment settings gain value ＊3	0	R/W
CEH	206	CH3 Industrial shipment settings offset value ＊3	0	R/W
CFH	207	CH3 Industrial shipment settings gain value ＊3	0	R/W
D0H	208	CH4 Industrial shipment settings offset value ＊3	0	R/W
D1H	209	CH4 Industrial shipment settings gain value ＊3	0	R/W
D2H	210	CH5 Industrial shipment settings offset value ＊3	0	R/W
D3H	211	CH5 Industrial shipment settings gain value ＊3	0	R/W
D4H	212	CH6 Industrial shipment settings offset value ＊3	0	R/W
D5H	213	CH6 Industrial shipment settings gain value ＊3	0	R/W
D6H	214	CH7 Industrial shipment settings offset value ＊3	0	R/W
E7H	215	CH7 Industrial shipment settings gain value ＊3	0	R/W
E8H	216	CH8 Industrial shipment settings offset value ＊3	0	R/W
E9H	217	CH8 Industrial shipment settings gain value ＊3	0	R/W
EAH	218	CH1 User range settings offset value ＊3	0	R/W
EBH	219	CH1 User range settings gain value ＊3	0	R/W
ECH	220	CH2 User range settings offset value ＊3	0	R/W
EDH	221	CH2 User range settings gain value ＊3	0	R/W
EEH	222	CH3 User range settings offset value ＊3	0	R/W
EFH	223	CH3 User range settings gain value ＊3	0	R/W
F0H	224	CH4 User range settings offset value ＊3	0	R/W
F1H	225	CH4 User range settings gain value ＊3	0	R/W
F2H	226	CH5 User range settings offset value ＊3	0	R/W
F3H	227	CH5 User range settings gain value ＊3	0	R/W
F4H	228	CH6 User range settings offset value ＊3	0	R/W
F5H	229	CH6 User range settings gain value ＊3	0	R/W
F6H	230	CH7 User range settings offset value ＊3	0	R/W
F7H	231	CH7 User range settings gain value ＊3	0	R/W
F8H	232	CH8 User range settings offset value ＊3	0	R/W
F9H	233	CH8 User range settings gain value ＊3	0	R/W

＊1 This is the initial value set after the power is turned on or the PLC CPU is reset.
＊2 Indicates whether reading and writing to/from a sequence program are enabled.
R : Reading enabled W : Writing enabled
＊3 Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

3.4.5 D/A conversion enable/disable (buffer memory address 0: Un\G0)

(1) Set whether D/A conversion is enabled or disabled for each channel.

(2) It is necessary to set the operating condition setting request (Y9) to ON/OFF to validate the D/A conversion enable/disable setting. (See Section 3.3.2.)

(3) By default, all channels are set to D/A conversion disabled.

(4) When Q62DA is used, b2 to b7 (CH3 to CH8) become invalid.

Un\G0

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH 1

For Q62DA, information for b4 to b15 is fixed at 0.
For Q64DA, information for b4 to b15 is fixed at 0.

1: D/A conversion disabled
0: D/A conversion enabled

3.4.6 CH□ digital values (buffer memory addresses 1 to 8: Un\G1 to Un\G8)

(1) This area is used to write digital values for performing D/A conversion from the PLC CPU as 16-bit signed binary code.

(2) Settings for digital values to be D/A converted when a value outside the valid digital value setting range is used are listed in Table 3.10.
When a value outside the valid range is written, a check code is stored in the set value check codes (Un\G11 to Un\G18).

(3) For Q62DA, Un\G3 to Un\G8 (CH3 to CH8) become invalid.
For Q64DA, Un\G5 to Un\G8 (CH5 to CH8) become invalid.

Table 3.10 Output range settings and valid range

Output range setting	Normal resolution mode		High resolution mode	
	Valid range (practical range)	Digital value that is set when a value outside the valid range is written	Valid range (practical range)	Digital value that is set when a value outside the valid range is written
0: 4 to 20 mA	0 to 4095 (Practical range: 0 to 4000)	4096 or larger: 4095 –1 or smaller: 0	0 to 12287 (Practical range: 0 to 12000)	12288 or larger: 12287 –1 or smaller: 0
1: 0 to 20 mA				
2: 1 to 5 V				
3: 0 to 5 V				
4: –10 to 10 V	–4096 to 4095 (Practical range: –4000 to 4000)	4096 or larger: 4095 –4097 or smaller: –4096	-16384 to 16383 (Practical range: -16000 to 16000)	16384 or larger: 16383 –16385 or smaller: 16384
F: User range setting			-12288 to 12287 (Practical range: -12000 to 12000)	12288 or larger: 12287 –12289 or smaller: –12288

3.4.7 CH□ set value check codes (buffer memory addresses 11 to 18: Un\G11 to Un\G18)

(1) This area stores the result of checking whether a digital value that was set is within or outside the valid range.

(2) When a digital value outside the valid range (see Table 3.10) is written, one of the check codes listed in Table 3.11 is stored.

Table 3.11 Check code list

Check code	Description
000F$_H$	A digital value exceeding the valid range was written.
00F0$_H$	A digital value that falls short of the valid range was written.
00FF$_H$	A digital value that either falls short or exceeds the valid range was written.

(3) Once a check code is stored, it will not be reset even if the digital value is within the valid range.

(4) To reset the CH□ set value check code, set the error clear request (YF) to ON after rewriting the digital value so that it is within the valid range.

(5) For Q62DA, Un\G13 to Un\G18 (CH3 to CH8) become invalid.
For Q64DA, Un\G15 to Un\G18 (CH5 to CH8) become invalid.

3.4.8 Error codes (buffer memory address 19: Un\G19)

(1) The error codes detected by the D/A converter module are stored.

(2) See Section 8.1 for more details of the error codes.

3.4.9 Setting range (buffer memory address 20, 21: Un\G20, Un\G21)

(1) This area is used to confirm the setting range of the D/A converter module.
Settings for channels 1 to 4 are stored in Un\G20.
Settings for channels 5 to 8 are stored in Un\G21.

(2) For Q62DA, b8 to b15 (CH3 and 4 information) for Un\G20 and Un\G21 (information of CH5 to CH8) are invalid.
For Q64DA, Un\G21 (CH5 to CH8 information) is invalid.

	b15 to b12	b11 to b8	b7 to b4	b3 to b0
Un\G20 (setting range CH1 to CH4)	CH4	CH3	CH2	CH1
Un\G21 (setting range CH5 to CH8)	CH8	CH7	CH6	CH5

Output range	Setting value
4 to 20 (mA)	0H
0 to 20 (mA)	1H
1 to 5 (V)	2H
0 to 5 (V)	3H
–10 to 10 (V)	4H
User range setting	FH

(3) 0H is default. Q68DAV is operated in 2H (1 to 5 V) setting even when 0H (default) is set for the output range setting so that 2H will be stored.

3.4.10 Offset/gain setting mode and offset/gain specification (buffer memory addresses 22, 23: Un\G22, Un\G23)

(1) Specifies the channel to be adjusted for the offset/gain settings.

(2) Specification can be made for 1 channel only.
An offset/gain setting mode error (error code 500) will occur if more than one channel is specified at the same time.

(3) For Q62DA, b2 to b7 (CH3 to CH8) are invalid.
For Q64DA, b4 to b7 (CH5 to CH8) are invalid.

(4) See Section 4.6 for the details of the offset/gain settings.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Un\G22 (Offset specification)	0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1
Un\G23 (Gain specification)	0	0	0	0	0	0	0	0	CH8	CH7	CH6	CH5	CH4	CH3	CH2	CH1

For Q62DA, b2 to b15 information is fixed at 0.
For Q64DA, b4 to b15 information is fixed at 0.

1: Channel to be set
0: Invalid

3.4.11 Setting value specification (buffer memory address 24: Un\G24)

(1) This area is used to set the amount of adjustment for analog output values in the offset/gain setting mode.

(2) The valid input range is from –3000 to 3000.
When the input value is 1000, the analog output values can be adjusted by about 0.33 V for voltage output and about 0.65 mA for current output.

(3) See Section 4.6 for the details of the offset/gain settings.

3.4.12 Mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159)

(1) Set the values of the mode to which you want to switch.

(2) After setting the values, turning the operation condition setting request (Y9) from OFF to ON switches to that mode.

(3) When mode switching is performed, this area is cleared to zero and the operating condition setting completed flag (X9) turns OFF.
After confirming that the operating condition setting completed flag (X9) has turned OFF, turn OFF the operation condition setting request (Y9).

Mode to be switched to	Set values	
	Buffer memory address 158	Buffer memory address 159
Normal mode	0964H	4144H
Offset/gain setting mode	4144H	0964H

POINT

If the values written are other than the above, mode switching is not performed and only the operating condition is changed.

3.4.13 Pass data classification setting (buffer memory addresses 200: Un\G200) (Q62DA, Q64DA only)

(1) Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

(2) Specify whether the offset/gain values to be saved/restored are voltages or currents when saving/restoring the offset/gain values of the user range setting.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	CH4	CH3	CH2	CH1

Q62DA: Data in b2 to b15 are fixed to 0.
Q64DA: Data in b4 to b15 are fixed to 0.

1: Current specified
0: Voltage specified

POINT

Refer to Section 4.6 for the offset/gain value setting method.

3.4.14 Industrial shipment settings and user range settings offset/gain values (buffer memory addresses 202 to 233: Un\G202 to Un\G233)

(1) Areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

(2) When the offset/gain values of the user range setting are restored, the used data are stored.
The data are stored (saved) when:
• Initial setting write is performed by the utility;
• The operating condition is set (Y9 turns from OFF to ON ∗1); or
• The offset/gain values are written in the offset/gain setting mode (YA turns from OFF to ON).
∗1: The data are not saved when values have been written to the mode switching setting area (buffer memory addresses 158, 159: Un\G158, Un\G159).

(3) When restoring the offset/gain values of the user range setting, set the data saved here similarly into the corresponding area of the module where the data will be restored.

(4) Buffer memory saving recording procedure for online module change
1) Set the pass data classification setting ∗ (buffer memory addresses 200: Un\G200).
2) Turn the operation condition setting request (Y9) from OFF to ON.
3) Compare the offset/gain values of the industrial shipment settings and user range settings (buffer memory addresses 202 to 233: Un\G202 to Un\G233) with the range reference values. Refer to Section 7.4 for the range reference values.
4) If the values are proper, record the offset/gain values of the pass data classification setting ∗, industrial shipment settings and user range settings.
∗: The Q68DAV/Q68DAI does not require the setting and recording of the pass data classification setting.

POINT
Refer to Section 4.6 for the offset/gain value setting method.

4 SETUP AND PROCEDURES BEFORE OPERATION

4.1 Handling Precautions

(1) Do not drop the module case or subject it to heavy impact.

(2) Do not remove the PCB of the module from its case. Doing so may cause the module to fail.

(3) Be careful not to let foreign particles such as swarf or wire chips enter the module. They may cause a fire, mechanical failure or malfunction.

(4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire burrs from entering the module during wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.

(5) Tighten the terminal screws using torque within the following ranges. Loose screws may cause short circuits, mechanical failures or malfunctions.

Screw location	Clamping torque range
Module mounting screws (M3 screws)	36 to 48 N · cm
Terminal block screws (M3 screws)	42 to 58 N · cm
Terminal block mounting screws (M3.5 screws)	66 to 89 N · cm
FG terminals screws (M3 screws) *	42 to 58 N · cm

* Q68DAV, Q68DAI only.

(6) To mount the module on the base, securely insert the module fastening latch into the fastening hole on the base. Improper installation may result in a module malfunction, or may cause the module to fall off.

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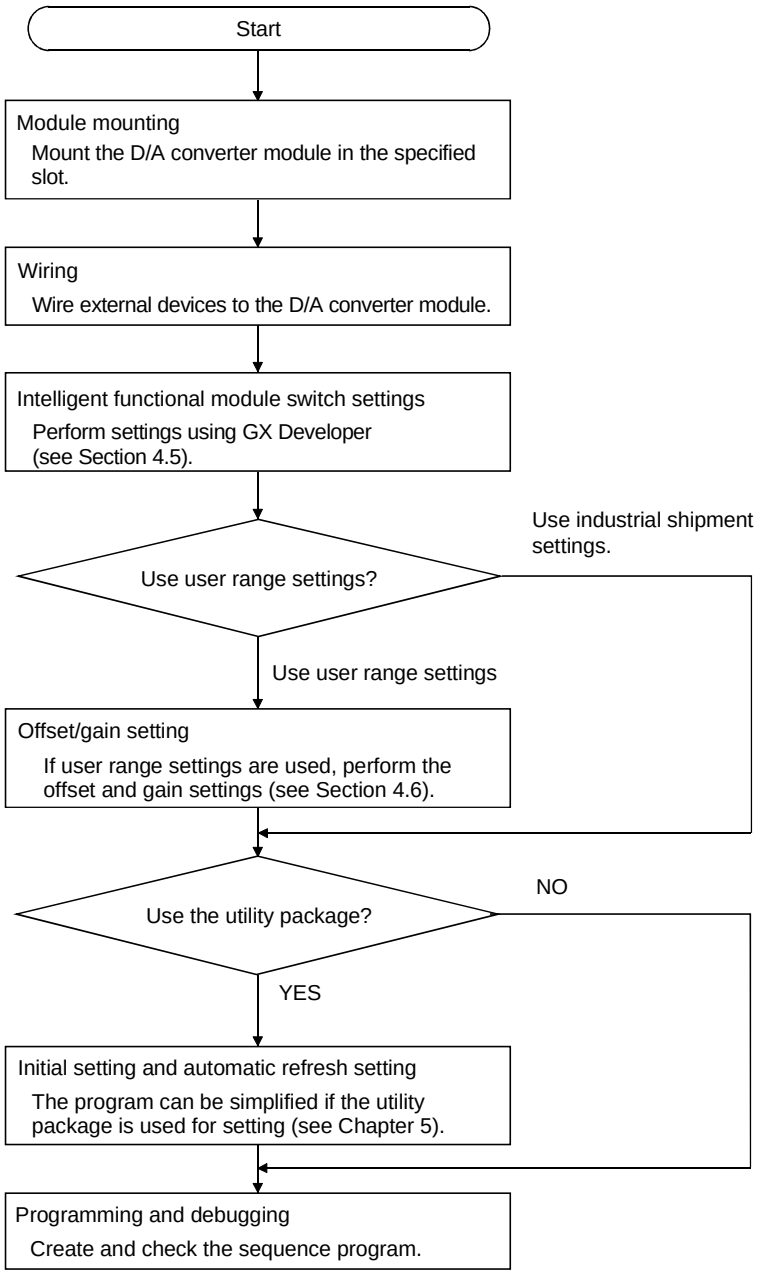
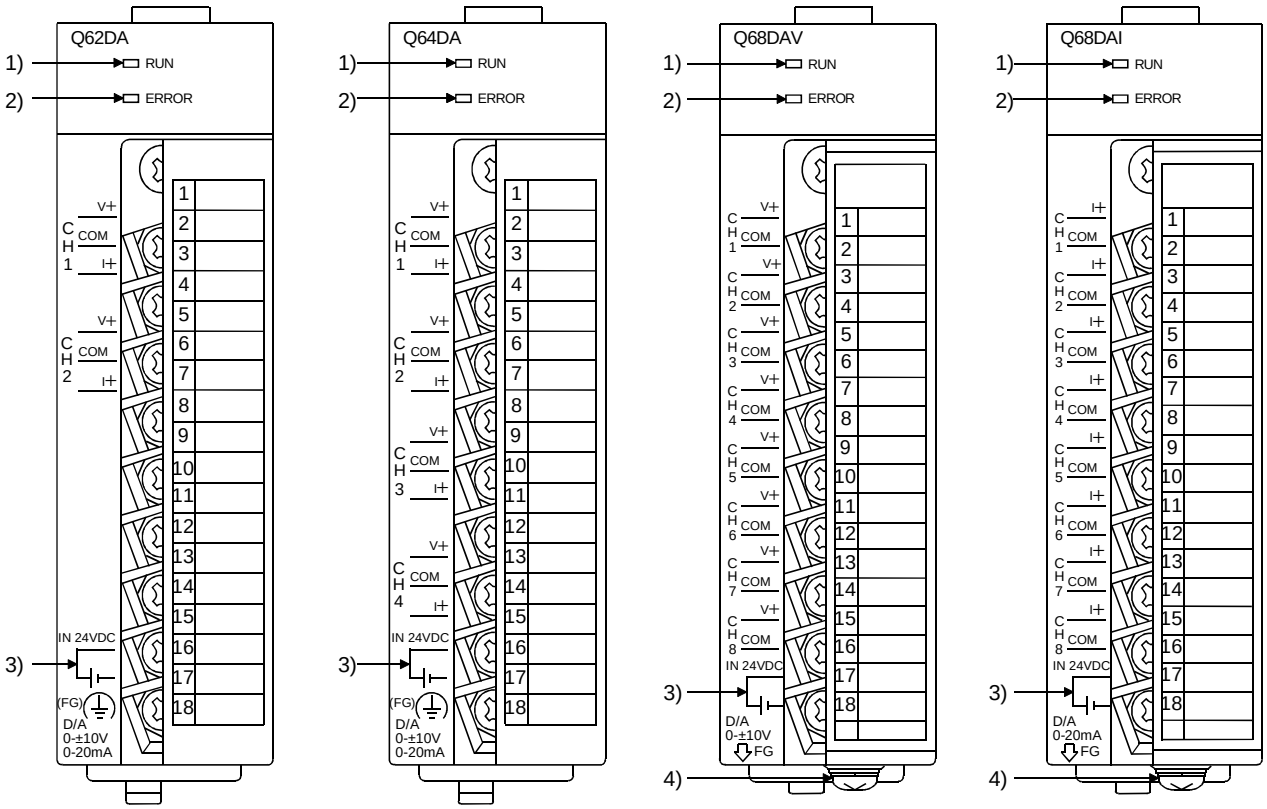
4.2 Setup and Procedures before Operation



4.3 Part Identification Nomenclature

The name of each part in the D/A converter module is listed below.

Q62DA Q64DA Q68DAV Q68DAI



Number	Name and appearance	Description
1)	RUN LED	Displays the operating status of the D/A converter module. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power switched off, watchdog timer error occurred, or online module change enabled
2)	ERROR LED	Displays the error status of the D/A converter module. On : Error ∗ Off : Normal operation Flashing : Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than "0".
3)	External power supply terminal	This is the terminal for connecting the 24 V DC external power supply.
4)	FG terminal	Frame ground terminal

∗ Check the error code for details.

Terminal number	Signal name							
	Q62DA		Q64DA		Q68DAV		Q68DAI	
1	CH1	V +	CH1	V +	CH1	V +	CH1	I +
2		COM		COM		COM		COM
3		I +		I +	CH2	V +	CH2	I +
4	Vacant		Vacant			COM		COM
5	CH2	V +	CH2	V +	CH3	V +	CH3	I +
6		COM		COM		COM		COM
7		I +		I +	CH4	V +	CH4	I +
8	Vacant		Vacant			COM		COM
9	Vacant		CH3	V +	CH5	V +	CH5	I +
10	Vacant			COM		COM		COM
11	Vacant			I +	CH6	V +	CH6	I +
12	Vacant		Vacant			COM		COM
13	Vacant		CH4	V +	CH7	V +	CH7	I +
14	Vacant			COM		COM		COM
15	Vacant			I +	CH8	V +	CH8	I +
16	24V					COM		COM
17	24G				24V			
18	FG				24G			

4 - 4

4.4 Wiring

The wiring precautions and examples of module connection are provided below.

4.4.1 Wiring precautions

In order to optimize the functions of the D/A converter module and ensure system reliability, external wiring that is protected from noise is required.
Please observe the following precautions for external wiring:

(1) Use separate cables for the AC control circuit and the external input signals of the D/A converter module to avoid the influence of the AC side surges and inductions.

(2) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the PLC. This may increase the effects of noise, surges and induction.

(3) Perform a one-point grounding for shielded lines and the shields of sealed cables.

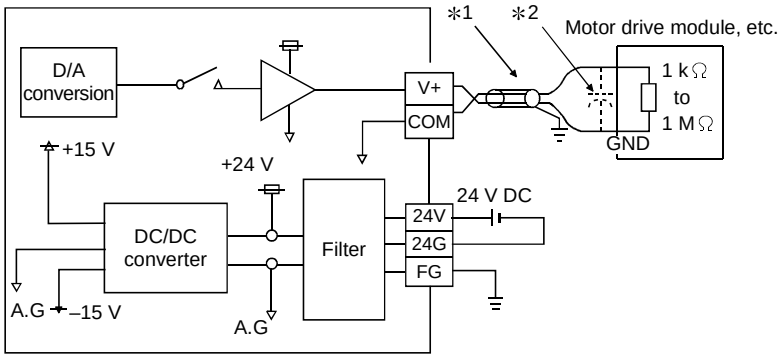
(4) A solderless terminal with insulating sleeve cannot be used for the terminal block. Covering the cable- connection portion of the solderless terminal with a marked tube or an insulation tube is recommended.

POINT
When using Q68DAV or Q68DAI, if it is difficult to wire FG terminals due to the limited installation space, use FG terminal L-shaped metal fitting.

4.4.2 External wiring

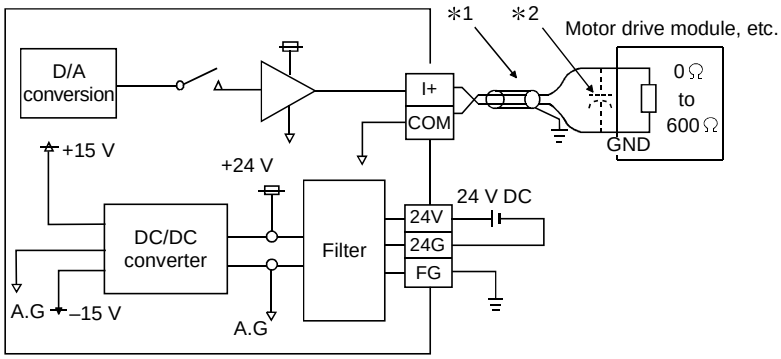
(1) For Q62DA and Q64DA

(a) For voltage output



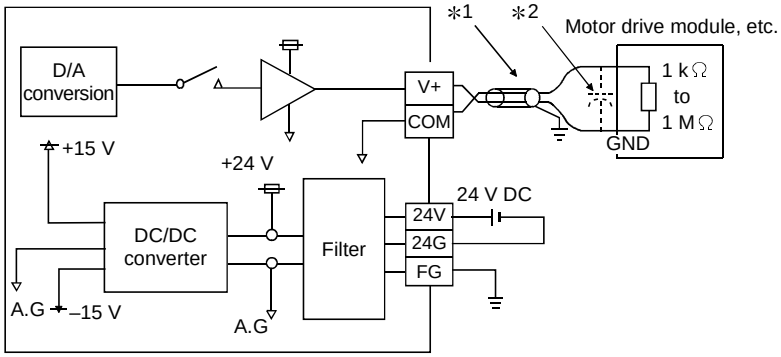
∗1 Use a twisted two core shielded wire for the power wire.
∗2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47 m F25V capacitor between the V+/I+ terminal and COM.

(b) For current output



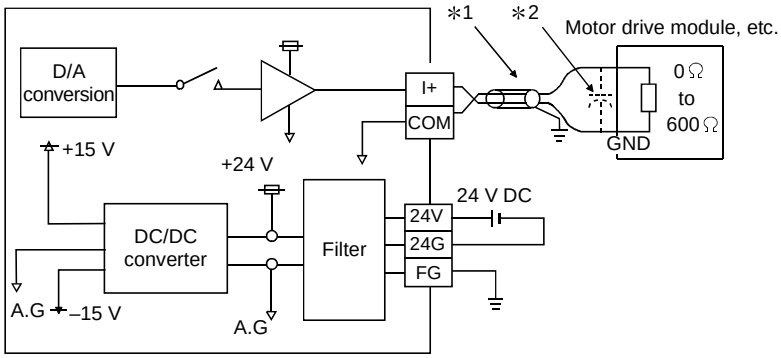
∗1 Use a twisted two core shielded wire for the power wire.
∗2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47 m F25V capacitor between the V+/I+ terminal and COM.

(2) For Q68DAV



∗1 Use a twisted two core shielded wire for the power wire.
∗2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47 m F25V capacitor between the V+/I+ terminal and COM.

(3) For Q68DAI



∗1 Use a twisted two core shielded wire for the power wire.
∗2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47 m F25V capacitor between the V+/I+ terminal and COM.

4.5 Switch Setting for Intelligent Function module

The settings for the intelligent function module are performed using the I/O assignment settings of GX Developer.

(1) Setting item

The intelligent function module switches consist of switches 1 to 5 and are set using 16 bit data. When the intelligent function module switches are not set, the default value for switches 1 to 5 is 0.

Table 4.1 Switch setting item for intelligent function module

<table>
<tr><th></th><th colspan="2">Setting item</th></tr>
<tr><td>Switch 1</td><td>Output range setting
(CH1 to CH4)
□□□□ H
CH4 CH3 CH2 CH1</td><td rowspan="2">
<table>
<tr><th>Analog output range</th><th>Output range setting value</th></tr>
<tr><td>4 to 20 mA</td><td>0H ＊1</td></tr>
<tr><td>0 to 20 mA</td><td>1H</td></tr>
<tr><td>1 to 5 V</td><td>2H</td></tr>
<tr><td>0 to 5 V</td><td>3H</td></tr>
<tr><td>– 10 to 10 V</td><td>4H</td></tr>
<tr><td>User range setting</td><td>FH</td></tr>
</table>
</td></tr>
<tr><td>Switch 2</td><td>Output range setting
(CH5 to CH8)
□□□□ H
CH8 CH7 CH6 CH5</td></tr>
<tr><td rowspan="2">Switch 3</td><td>For Q62DA and Q64DA
□□□□ H
CH4 CH3 CH2 CH1</td><td>HOLD/CLEAR function setting
0H : CLEAR
1 to FH (numeric value other than 0H) : HOLD</td></tr>
<tr><td>For Q68DAV and Q68DAI
b15 b8 b7 b6 b5 b4 b3 b2 b1 b0
0 to 0 □□□□□□□□
CH8 CH7 CH6 CH5 CH4 CH3 CH2 CH1</td><td>HOLD/CLEAR function setting
0 : CLEAR
1 : HOLD</td></tr>
<tr><td>Switch 4</td><td colspan="2">□□□□ H
00H : Normal mode (non-synchronized)
01 to FFH (numeric value other than 00H)*: Synchronized output mode
0H : Normal resolution mode
1 to FH (numeric value other than 0H)*: High resolution mode
0H : Normal mode (D/A conversion processing)
1 to FH (numeric value other than 0H)*: Offset/gain setting mode</td></tr>
<tr><td>Switch 5</td><td colspan="2">0 : Fixed</td></tr>
</table>

＊ Setting any value within the setting range will provide the same operation. When the setting range is 1 to FH, set 1 for example.

POINT

(1) Depending on the type of module used, the settings for D/A module output range are shown below.
- Q62DA, Q64DA·····0H to 4H, FH
- Q68DAV·····0H, 2H to 4H, FH
  ✻1: When the setting is 0H, the output operating range swill be 1 to 5 V.
- Q68DAI·····0H, 1H, FH

(2) For Q62DA and Q64DA, leave the switch2 vacant.

(3) For Q68DAV and Q68DAI, the switch 3 will set in binary.
Setting will be easy if the input format is changed to binary number.
Example) For setting CH3, CH5 and CH8 to HOLD.

Input format	Binary	Hexadecimal
Setting value	10010100	94 H

(4) If the offset/gain setting mode is set using intelligent function module switch 4, other settings by switch 4 (settings for resolution mode and synchronous output mode) will be ignored.

(5) Setting of the offset/gain setting mode differs from function version A to function version B.
Perform the offset/gain settings after checking the RUN LED flashes in offset/gain setting mode. If the RUN LED does not flash, check to see if the switch 4 setting is correct. (Refer to Appendix 1.3)

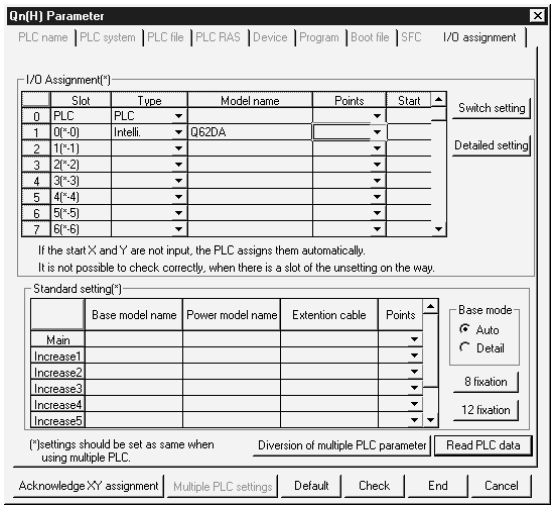
(6) Since the analog output value will differ considerably, depending on the resolution mode setting, thoroughly check the settings for the intelligent function module switches before performing the analog output processing.

Example) Analog output value when the setting range is -10 to 10V and the digital input value is set to 4000.

	High resolution mode	Normal resolution mode
Analog output value	About 2.5 V	About 10.0 V

(2) Operating procedure

Start the settings with GX Developer I/O assignment setting screen.

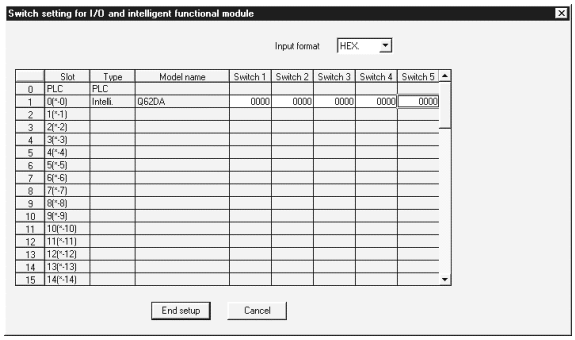


(a) I/O assignment setting screen

Set the following for the slot in which the D/A converter module is mounted.

The type setting is required; set other items as needed.

Type	: Select "intelli."
Model name	: Enter the module model name.
Points	: Select 16 points.
Start XY	: Enter the start I/O number for the D/A converter module.
Detailed setting	: Specify the control PLC for the D/A converter module. It is unnecessary to set the "Error time output mode" or "H/W error time PLC operation mode" since these settings are invalid for the D/A converter module.



(b) Switch setting for intelligent function module screen

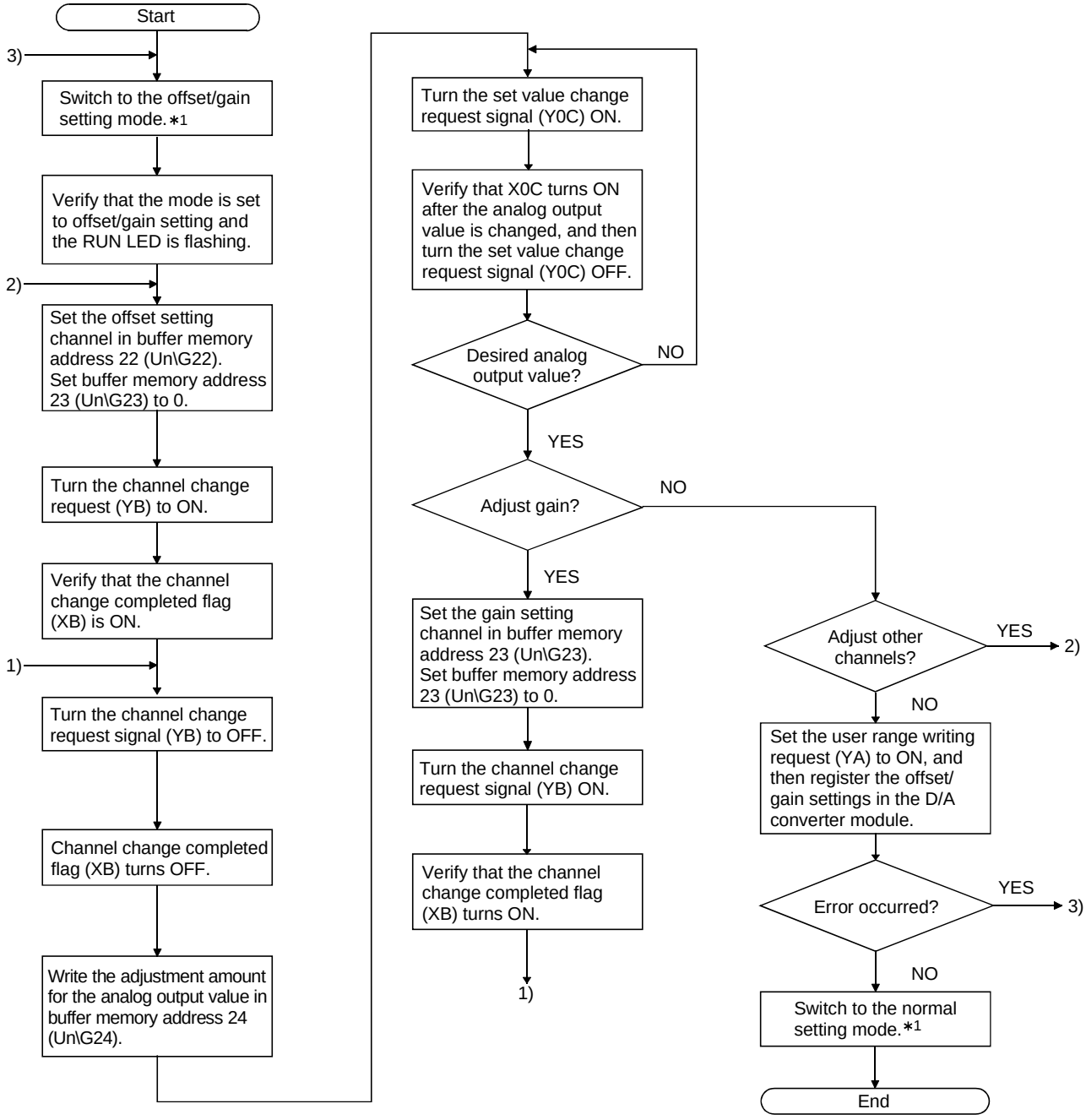
Click on [Switch setting] on the I/O assignment setting screen to display the screen shown at the left, then set switches 1 to 5.

The switches can easily be set if values are entered in hexadecimal. Change the entry format to hexadecimal and then enter the values.

4.6 Offset/Gain Settings

When the user range setting is used, perform the offset and gain settings according to the following procedure.
When the industrial shipment setting is used, offset/gain setting is not necessary.
If the utility package is installed, perform the offset/gain settings according to the pocedure described in Section 5.6.2.

(1) Offset/gain setting procedure



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*1 The mode switching (normal mode to offset/gain setting mode to normal mode) method is given below.

- Dedicated instruction (G.OFFGAN) ..... Refer to Section 4.6 (2), (a)
- Setting made to mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning the operation condition setting request (Y9) from OFF to ON ..... Refer to Section 4.6 (2), (b)
- Intelligent function module switch setting ..... Refer to Section 4.5, Section 4.6 (2), (c)
  (After intelligent function module switch setting, reset the PLC CPU or switch power OFF, then ON.)

POINT

(1) Perform the offset/gain settings in the range that satisfies the conditions specified in Section 3.1.2, (1) and (2).
When the setting exceeds this range, the maximum resolution or total accuracy may not be within the range indicated in the performance specification.

(2) Perform the offset/gain settings separately for each channel. If channels are set in buffer memory addresses 22 (Un\G22) and 23 (Un\G23) at the same time, an error will occur and the ERROR LED will be lit.

(3) After the offset and gain settings are completed, verify that the offset and gain values have been set correctly under actual usage conditions.

(4) The offset and gain values are stored into the E^2PROM and are not erased at power-off.

(5) At the time of offset/gain setting, turn ON the user range write request (YA) to write the values to the E^2PROM.
Data can be written to the E^2PROM up to 100 thousand times.
To prevent accidental write to the E^2PROM, an error will occur and the error code (buffer memory address 19: Un\G19) will be stored if write is performed 26 consecutive times.

(6) If an error (error code: 40 □ *1) occurs during offset/gain setting, re-set the correct offset/gain value.
The offset/gain value of the channel where the error has occurred is not written to the D/A converter module. (*1: □ indicates the corresponding channel number.)

(7) Module Ready (X0) turns from OFF to ON when the offset/gain setting mode switches to the normal mode by the dedicated instruction (G.OFFGAN) or the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159).
Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module Ready (X0) turns ON.

(8) D/A conversion is discontinued if the mode is switched (from the normal mode to the offset/gain setting mode or from the offset/gain setting mode to the normal mode) by the dedicated instruction (OFFGAN) or the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159).

(9) Buffer memory addresses 200 (Un\G200), 202 to 233 (Un\G202 to Un\G233) are the areas used to restore the user range settings offset/gain values when online module change is made.
Refer to chapter 7 for details of online module change.

(2) Program examples

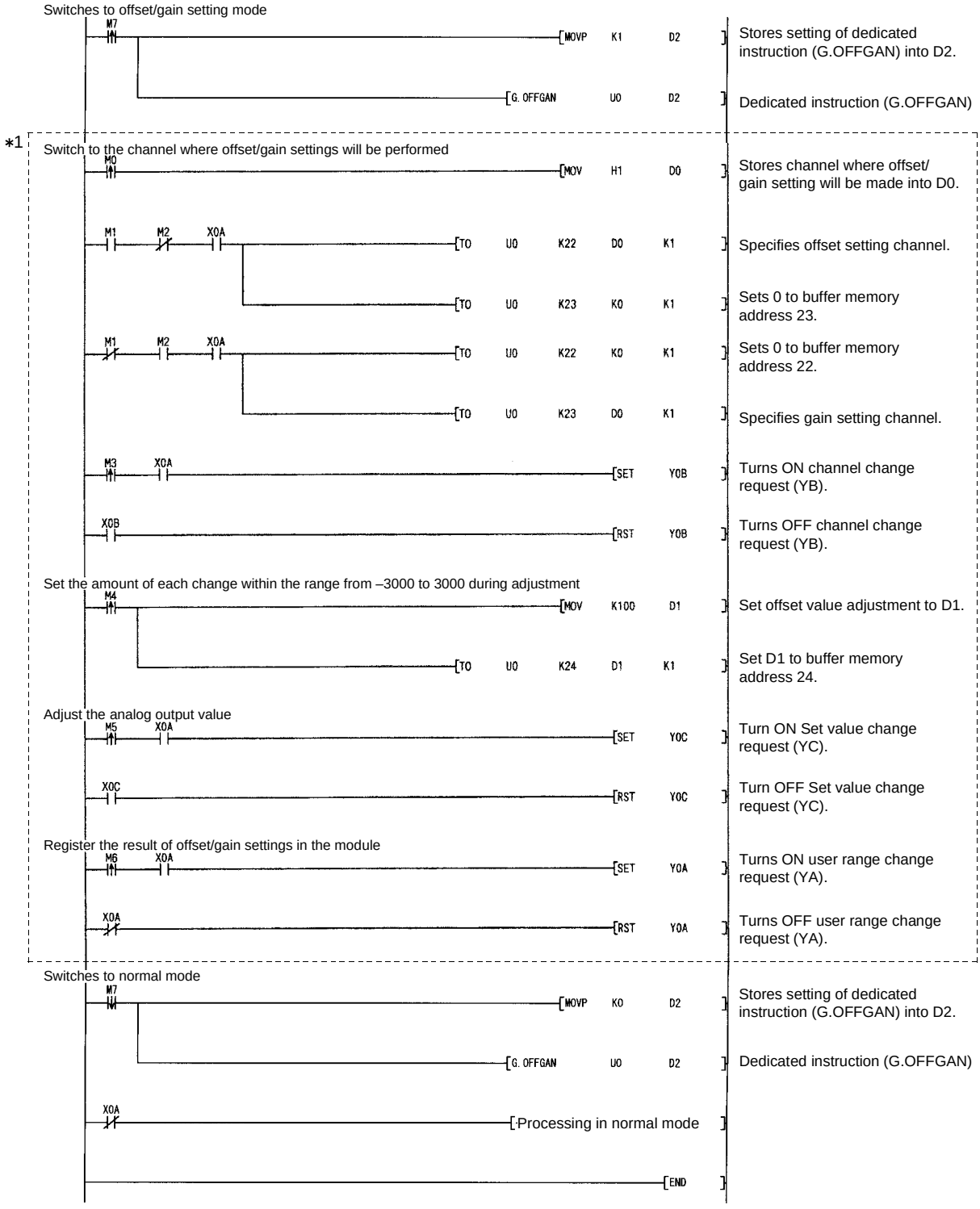
The program in the dotted area of (a) is common to (a), (b) and (c).

In this example, the I/O signals for the D/A converter module are X/Y0 to X/YF.

- Channel selection ····· M0
- Offset setting ····· M1
- Gain setting ····· M2
- Channel change command ····· M3
- Writing the adjustment amount ····· M4
- Analog output value adjust command ····· M5
- Offset/gain setting value write command to the module ····· M6
- Mode switching····· M7
- Normal mode checking signal····· M50
- Channel designation storage device····· D0
- Dedicated instruction (G.OFFGAN) setting storage device····· D2
- Offset/gain adjustment storage device····· D1

(a) When switching the mode using the dedicated instruction (G.OFFGAN)

The following sample program switches to the offset/gain setting mode with the dedicated instruction (G.OFFGAN), changes the channel where offset/gain setting will be made, adjusts the offset/gain values, and writes the offset/gain values to the D/A converter module.



*1 The program in the dotted area is a common program.

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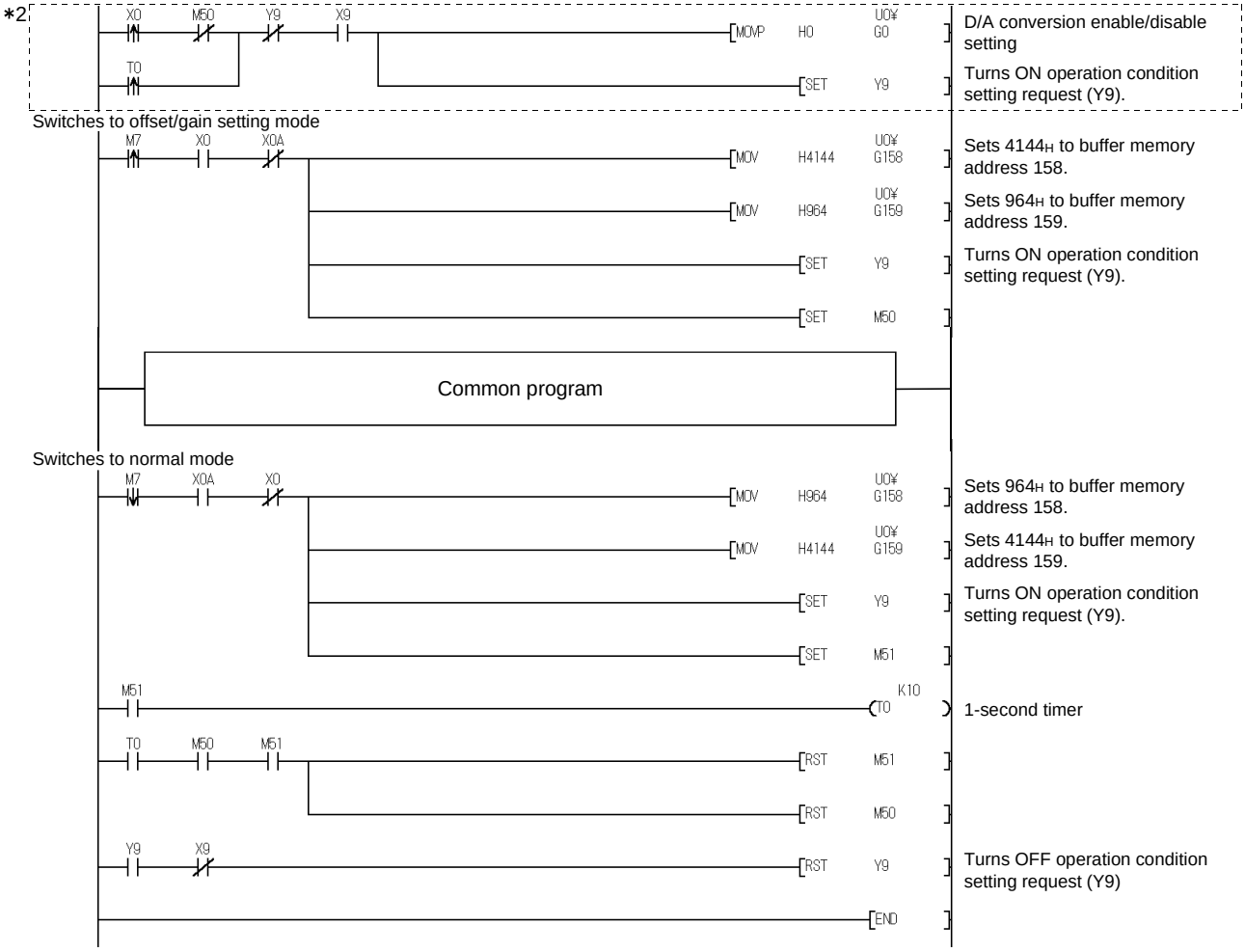
(b) When switching the mode using the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and operation condition setting request (Y9)



POINT
When switching the mode using the setting of the mode switching setting and operating condition setting request, correct the initial setting program into the program marked ∗2.

(c) When switching the mode by making intelligent function module switch setting

Only the common program is necessary.

5 UTILITY PACKAGE (GX Configurator-DA)

5.1 Utility Package Functions

Table 5.1 shows an overview of the utility package functions.

Table 5.1 Utility package (GX Configurator-DA) function list

Item	Description	Reference section
Initial Setting ＊1	(1) Sets the D/A conversion enable/disable. (2) The data for which initial setting has been completed is registered in the parameters for the PLC CPU, and automatically written to the D/A converter module when the PLC CPU changes to RUN status.	Section 5.4
Automatic Refresh Setting ＊1	(1) Sets automatic refresh for the D/A converter module buffer memory. (2) The buffer memory that was set for automatic refresh is automatically read and written to the specified device when the END command for the PLC CPU is executed.	Section 5.5
Monitor/test	(1) Monitor/test The buffer memory and I/O signals for the D/A converter modules are monitored and tested. (2) Operating condition setting Changes the D/A conversion enable/disable during operation. (3) Offset/gain setting When setting the offset/gain to a value selected by the user (when the analog output range setting is user range setting), the offset and gain can be easily set while viewing the screen. (4) Pass data The pass data (pass data classification setting, industrial shipment settings offset/gain values, user range settings offset/gain values) can be monitored and set.	Section 5.6

POINT
＊1 If initial setting and automatic refresh setting are performed, the intelligent function module parameters require a maximum of 24 bytes per module.

5.2 Installing and Uninstalling the Utility Package

See "Method of installing the MELSOFT Series" attached with the utility package regarding the install and uninstall operation for the utility package.

5.2.1 User precautions

The following are precautions when using GX Configurator-DA:

(1) Important safety information

Since GX Configurator-DA is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures in GX Developer's operating manual.

(2) About installation

The GX Configurator-DA is an add-in package for GX Developer Version 4 or later products. Therefore, install GX Configurator-DA in a personal computer in which the GX Developer Version 4 or a later product has been installed.

(3) About display-screen errors while using the intelligent function module utility

There may be cases in which the screen will not properly display while the intelligent function module utility is being used, due to a lack of system resources. If this occurs, close the intelligent function module utility first and then GX Developer (program, comments, etc.) and other applications. Next, restart GX Developer and the intelligent function module utility.

(4) To start the intelligent function module utility

(a) In GX Developer, select "QCPU (Q mode)" for the PC series and specify the project.
If something other than "QCPU (Q mode)" is selected for the PC series, or if the project is not specified, the intelligent function module utility will not start.

(b) Multiple intelligent function module utilities can be started.
However, the [Open file]/[Save file] intelligent function module's parameter operations can only be performed by a single session of the intelligent function module utility. Other intelligent function module utilities can only perform [Monitor/test] operation.

(5) How to switch screens when two or more intelligent function module utilities are started

When two or more intelligent function module utility screens cannot be displayed side by side, use the task bar to change the intelligent function module utility screen so that it is displayed on top of other screens.

(6) About the number of parameters that can be set in GX Configurator-DA

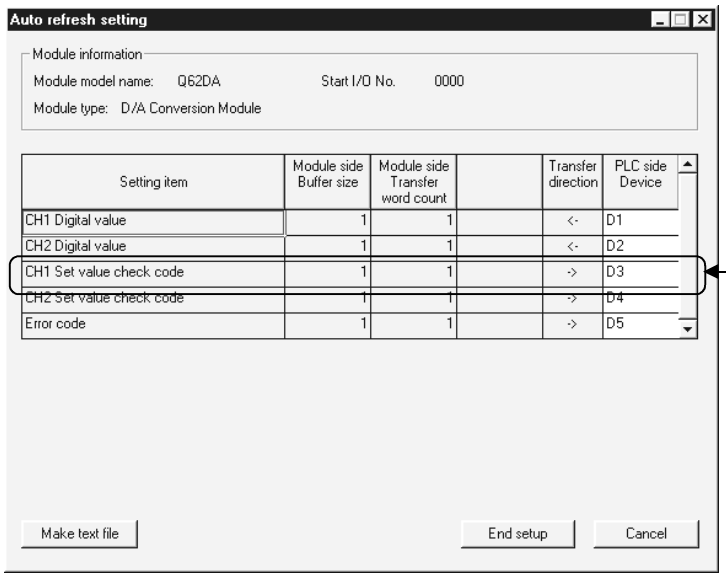
The number of parameters that can be set by the GX Configurator for an intelligent function module installed in the CPU module and in a remote I/O station of the MELSECNET/H network system is limited.

Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Automatic refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed in a remote I/O station, set the GX Configurator so that the number of parameter settings of all the intelligent function modules does not exceed the maximum number of parameter settings.
The total number of parameter settings is calculated separately for the initial setting and for the automatic refresh setting.
The number of parameter settings that can be set for one module in the GX Configurator-DA is as shown below.

Object Module	Initial setting	Automatic refresh setting
Q62DA	1 (Fixed)	5 (Maximum number of settings)
Q64DA	1 (Fixed)	9 (Maximum number of settings)
Q68DAV/Q68DAI	1 (Fixed)	17 (Maximum number of settings)

Example) Counting the number of parameter settings in the automatic refresh setting



The number of settings in this one line is counted as one setting.
The number of settings is not counted by columns.
Add up all the setting items in this setting screen, then add them to the total for the other intelligent function modules to get a grand total.

5.2.2 Operating environment

The operating environment of the personal computer where the GX Configurator-DA is used is explained.

Item		Peripheral devices
Installation (Add-in) destination ＊1		Add-in to GX Developer Version 4 (English version) or later ＊2
Computer main unit		Personal computer on which Windows® operates.
	CPU	Refer to the following table "Used operating system and performance required for personal computer".
	Required memory	
Hard disk free space	For installation	65 MB or more
	For operation	10 MB or more
Display		800 × 600 dot or more resolution ＊3
Operating system		Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) Microsoft® Windows® XP Home Edition Operating System (English version)

＊1: Install the GX Configurator-DA in GX Developer Version 4 or higher in the same language. GX Developer (English version) and GX Configurator-DA (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-DA (English version) cannot be used in configuration.

＊2: GX Configurator-DA cannot be used as an add-in with GX Developer Version 3 or earlier versions.

＊3: Setting fonts Size of Windows® for "Large Fonts" may cause the text to extend off screen. Therefore, choose "Small Fonts".

Used operating system and performance required for personal computer

Operating system		Performance Required for Personal Computer	
		CPU	Required memory
Windows® 95		Pentium® 133MHz or more	32MB or more
Windows® 98		Pentium® 133MHz or more	32MB or more
Windows® Me		Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0		Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional		Pentium® 133MHz or more	64MB or more
Windows® XP Professional	"XP compatibility mode" and "Fast User Switching" are not supported.	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition		Pentium® 300MHz or more	128MB or more

5.3 Explanation of Utility Package Operation

5.3.1 How to perform common utility package operations

(1) Available control keys

Special keys that can be used during operation of the utility package and their applications are shown in the table below.

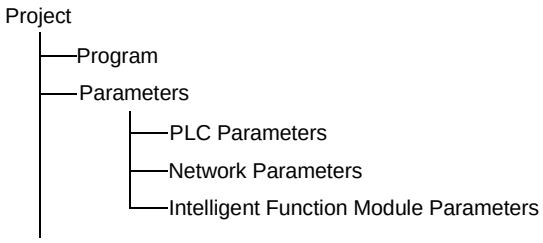
Name of key	Application
Esc	Cancels a newly entered value when entering data in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Use in conjunction with the mouse when multiple cells are selected in the selection test.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents.
Back Space	Deletes the character where the cursor is positioned.
↑ ↓ ← →	Moves the cursor.
Page Up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Confirms the value entered in the cell.

(2) Data to be created with the utility package

The data and files shown below that are created with the utility package are also processed using GX Developer operation. Figure 5.1 shows which operation processes which data or file.

<Intelligent function module parameters>

(a) This data is created with the automatic refresh setting, and stored in the intelligent function module parameter file of the project to be created using GX Developer.



(b) Steps 1) to 3) shown in Figure 5.1 are performed using the following operations.

1) Operating from GX Developer.
[Project] → [Open existing project] / [Save project] / [Save project as]
2) Operating from the utility parameter setting module selection screen.
[File] → [Open file] / [Save file]
3) Operating from GX Developer.
[Online] → [Read from PLC] / [Write to PLC] → "Intelligent function module parameters"
Or, operate from the utility parameter setting module selection screen.
[Online] → [Read from PLC] / [Write to PLC]

<Text file>

(a) A text file is created by performing the initial setting or automatic refresh setting, or selecting text file creation in the monitor/test screen. The text files can be utilized to create user documents.

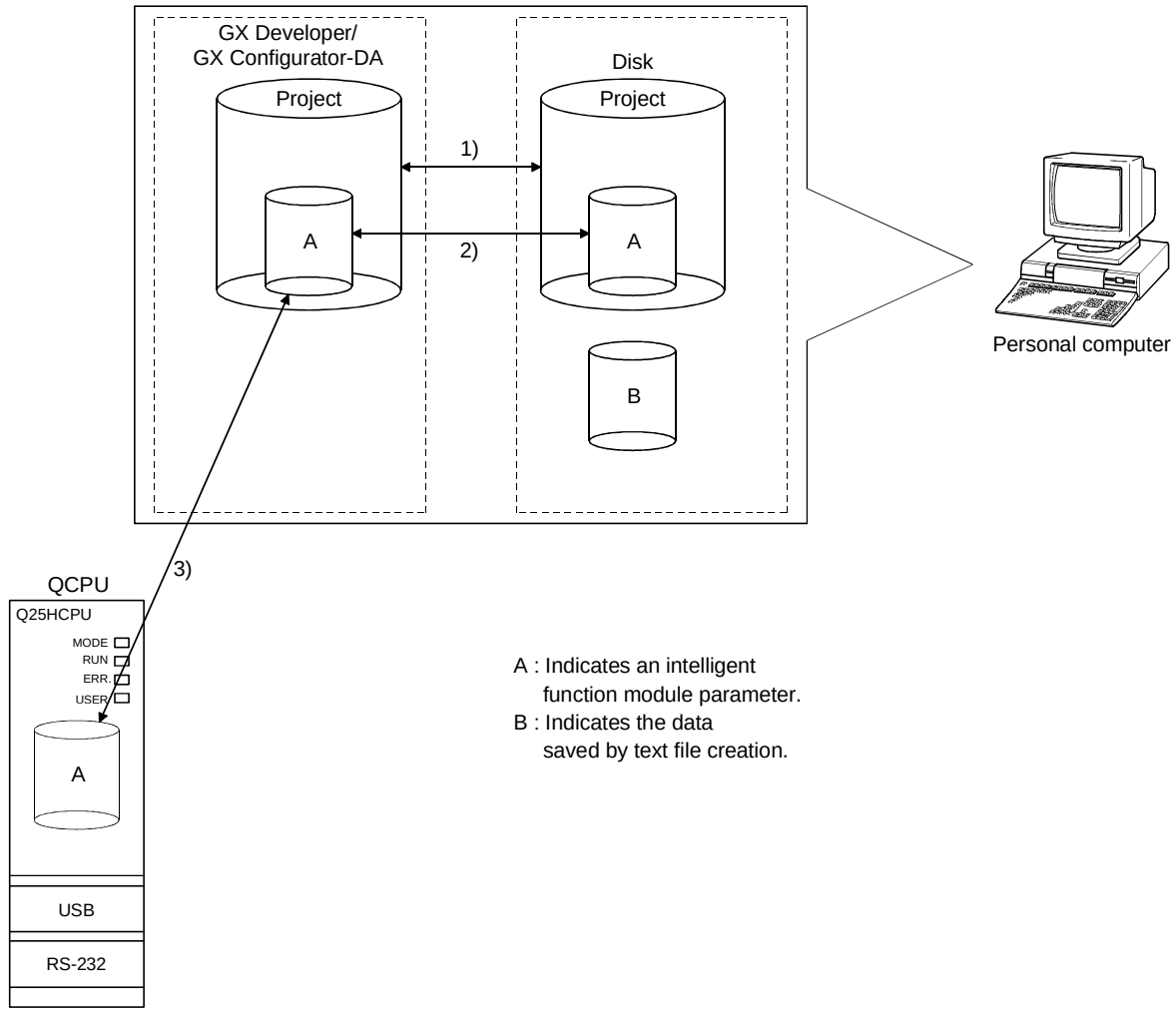


Figure 5.1 Correlation chart for data created using the utility package

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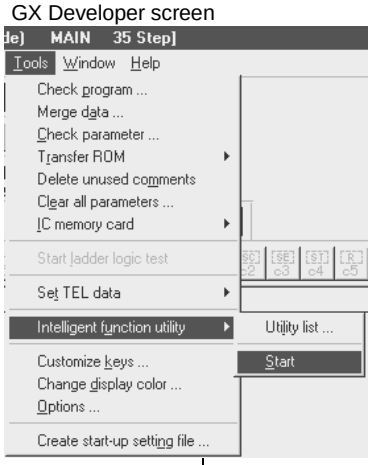
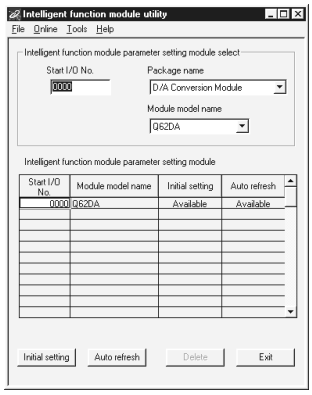
5.3.2 Operation overview

GX Developer screen



[Tools] – [Intelligent function utility] – [Start]

Intelligent function module parameter setting module select screen



1)

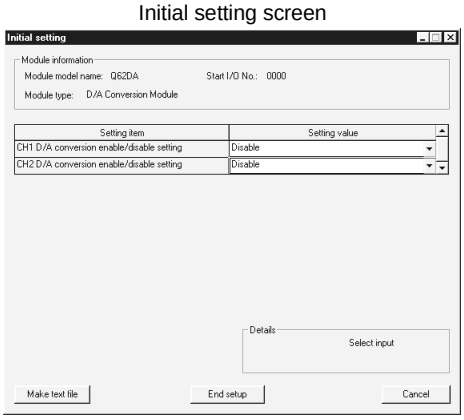
See Section 5.3.3

Enter "Start I/O No.", than select "Package name" and "Module model name".

Initial setting

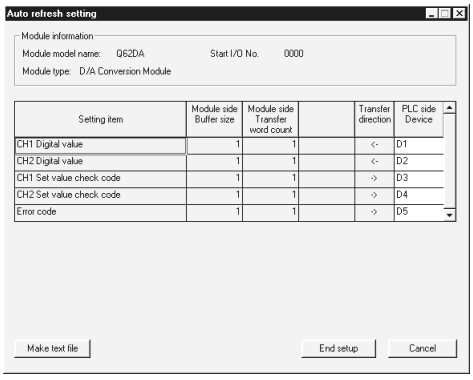
Auto refresh

Initial setting screen



See Section 5.4

Automatic refresh setting screen

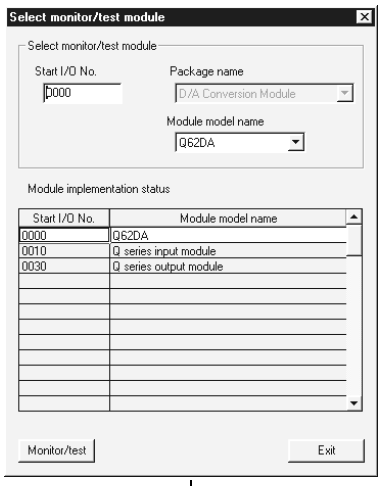


See Section 5.5

1)

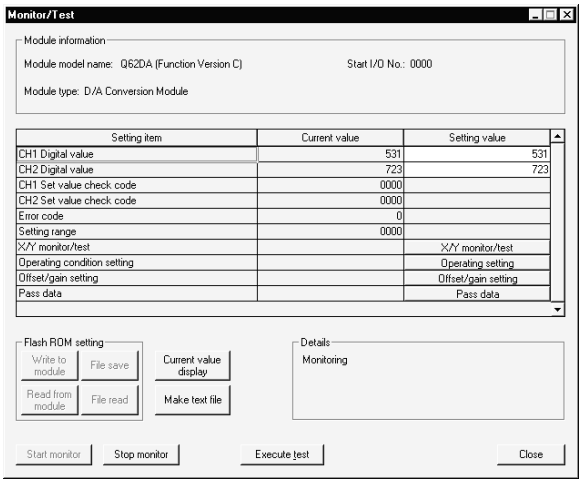
[Online] – [Monitor/test]

Select monitor/test module screen



Enter "Start I/O No.", than select "Package name" and "Module model name".

Monitor/test screen



See Section 5.6

5.3.3 Starting the intelligent function module utility

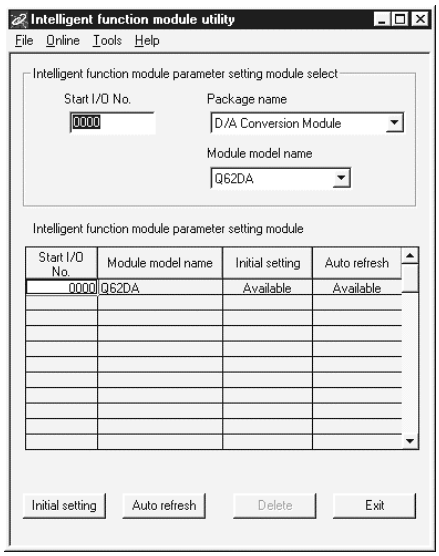
[Purpose of setting]

Start the intelligent function module utility from GX Developer, and display the module selection screen for the intelligent function module utility parameter setting. The screens for performing initial setting, automatic refresh setting and monitor/test module selection (selecting the module for which testing/monitoring is to be performed) for D/A converter module, can be started from this screen.

[Startup procedure]

[Tools] → [Intelligent function utility] → [Start]

[Setting screen]



[Explanation of items]

(1) How to start each screen

(a) Starting initial setting
"Start I/O No.∗" → "Package name" → "Module model name" → Initial setting

(b) Starting automatic refresh setting
"Start I/O No.∗" → "Package name" → "Module model name" → Auto refresh

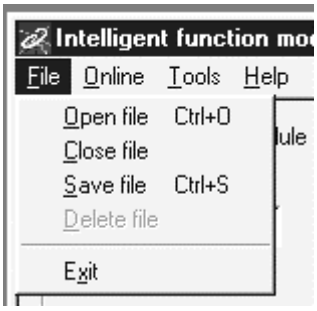
(c) Monitor/test module selection screen
[Online] → [Monitor/test]

∗ Enter the start I/O numbers in hexadecimal.

(2) Explanation of screen command buttons

Delete	Deletes the initial setting and automatic refresh setting for the selected module.
Exit	Ends the Intelligent function module utility.

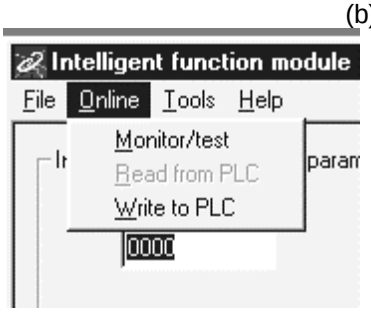
(3) Menu bar



(a) File items

With file operation, the intelligent function module parameters for the project opened by GX Developer can be processed.

[Open file]	:	Reads the parameter file.
[Close file]	:	Closes the parameter file. If revisions were made, a dialog box asking whether to save the file appears.
[Save file]	:	Saves the parameter file.
[Delete file]	:	Deletes the parameter file.
[Exit]	:	Quits the intelligent function module utility.



(b) Online items

[Monitor/test]	:	Starts the monitor/test module selection screen.
[Read from PLC]	:	Reads the intelligent function module parameters from the CPU module.
[Write to PLC]	:	Writes the intelligent function module parameters to the CPU module.

POINT

(1) Saving the intelligent function module parameter files
Since files cannot be saved using the GX Developer project save operation, save the files using the module selection screen for intelligent function module parameter setting described above.

(2) Reading from and writing to PLC operations for the intelligent function module parameters using GX Developer

(a) After the intelligent function module parameters are saved in a file, they can be read from and written into the PLC.

(b) Set the target PLC CPU using GX Developer [Online] → [Transfer setup].

(c) When the D/A converter module is installed to the remote I/O station, use "Read from PLC" and "Write to PLC".

(3) Checking for the required utility
Start I/O No. is displayed in the Intelligent function module utility setting screen, but a "*" may be displayed for the model name.
This means that either the required utility is not installed or that the utility cannot be started from the GX Developer.
Check for the required utility in [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer, and set it.

5.4 Initial Setting

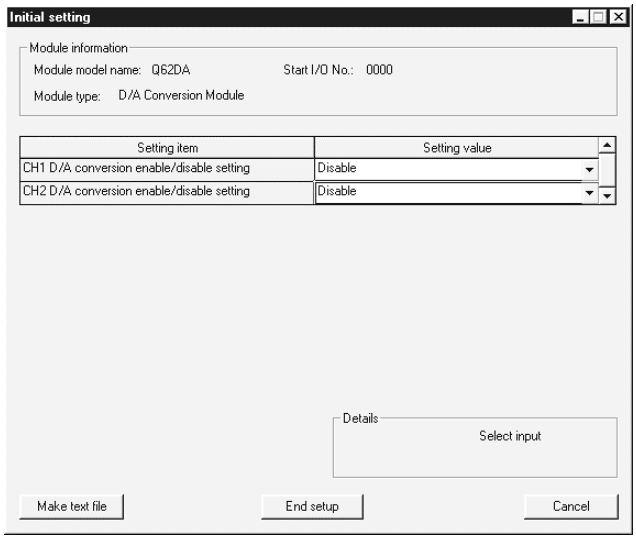
[Purpose of setting]

Set D/A conversion enable/disable with an initial setting parameter. The initial setting parameter eliminates the need to set D/A conversion enable/disable in the sequence program.

[Startup procedure]

"Start I/O No.✻" → "Package name" → "Module model name" → Initial setting

[Setting screen]



[Explanation of items]

(1) Setting contents

Set whether D/A conversion is "Enable" or "Disable" for each channel.

(2) Explanation of command buttons

Make text file	Outputs the screen display in text file format.
End setup	Confirms the setting data and ends the operation.
Cancel	Cancels the setting data and ends the operation.

POINT

Initial settings are stored in the intelligent function module parameters. After the initial settings are written to the CPU module, they are validated by operating the RUN-STOP switch as follows, STOP → RUN → STOP → RUN, turning the power OFF and then ON, or resetting the CPU module.

When using a sequencer program to write the initial settings, when the CPU is switched from STOP to RUN the initial settings will be written, So ensures that programming is carried out to re-execute the initial settings.

5.5 Automatic Refresh Settings

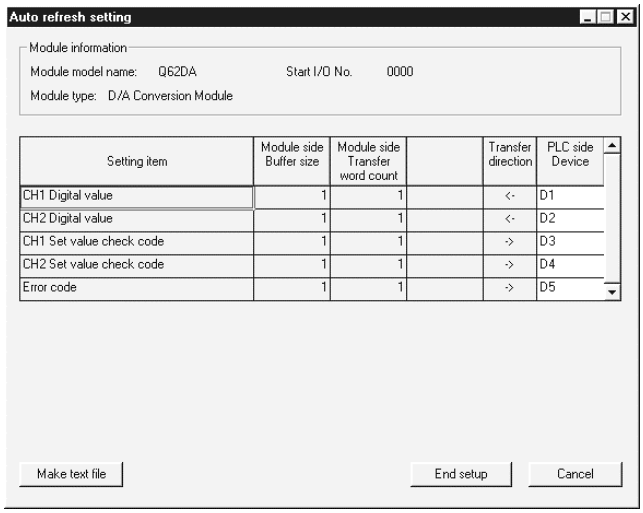
[Purpose of setting]

Sets the buffer memory for the D/A converter module to be automatically refreshed.

[Startup procedure]

"Start I/O No.✻" → "Package name" → "Module model name" → Auto refresh

[Setting screen]



[Explanation of items]

(1) Contents of the screen display

Model side Buffer size : Displays the size of the buffer memory for the setting item (fixed at one word).

Model side Transfer word count : Displays the number of words to be transferred to the CPU devices from the designated address (fixed at one word).

Transfer direction : "←" indicates that data is written from the device to the buffer memory.
"→" indicates that data is read from the buffer memory to the device.

PLC side Device : Enter the device in the CPU module to be automatically refreshed.
The devices that can be used are X, Y, M, L, B, T, C, ST, D, W, R, ZR. When using bit devices, K, Y, M, L or B, set a number that can be divided by 16 points (examples: X10, Y120, M16).
Also, buffer memory data is stored in 16 point blocks starting from the device number that was set. For example, if X10 is set, data will be stored from X10 to X1F.

(2) Explanation of command buttons

Make text file	A file containing the screen contents is created in text file format.
End setup	Confirms the setting data and ends the operation.
Cancel	Cancels the setting data and ends the operation.

POINT

The automatic refresh settings are stored in the intelligent function module parameters. After the automatic refresh settings are written to the CPU module, they are validated by performing STOP → RUN → STOP → RUN operations for the CPU module, turning the power OFF and then ON, or resetting the CPU module.

The automatic refresh settings cannot be changed from the sequence program. However, it is possible to add a process similar to automatic refresh by using the FROM/TO instructions of the sequence program.

5.6 Monitor/Test

5.6.1 Monitor/test screen

[Purpose of setting]

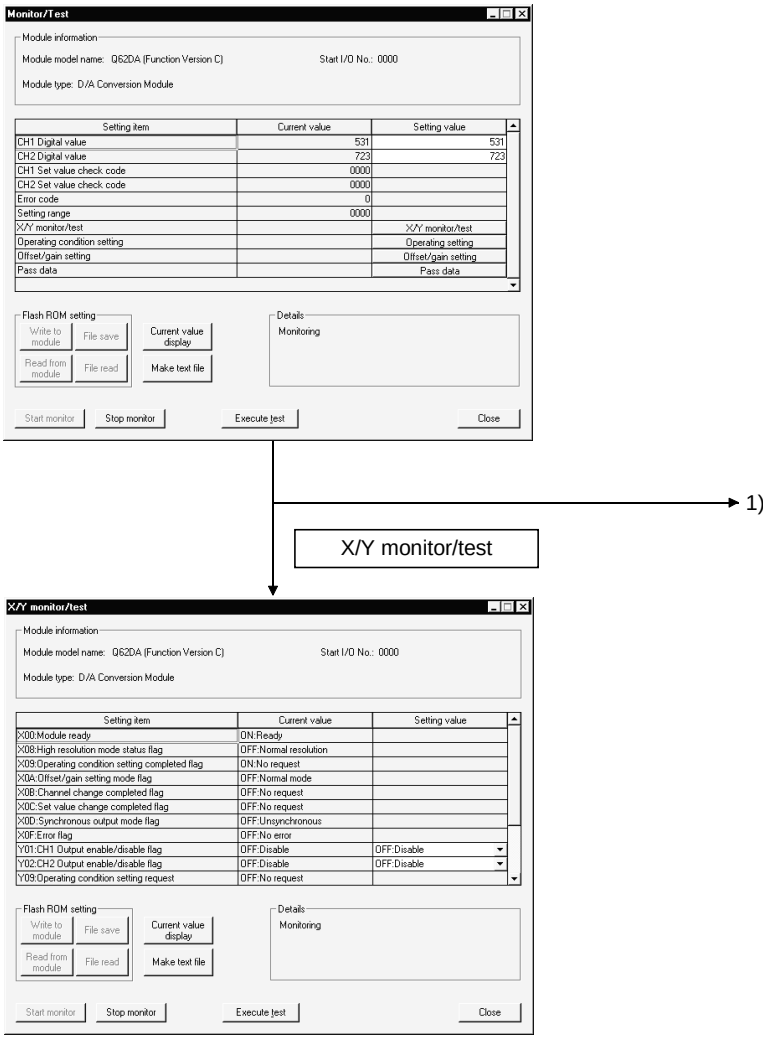
Buffer memory monitoring/testing, I/O signals monitoring/testing, operating condition setting, offset/gain settings (see Section 5.6.2, 5.6.3), pass data (see Section 5.6.4, 5.6.5) are started from this screen.

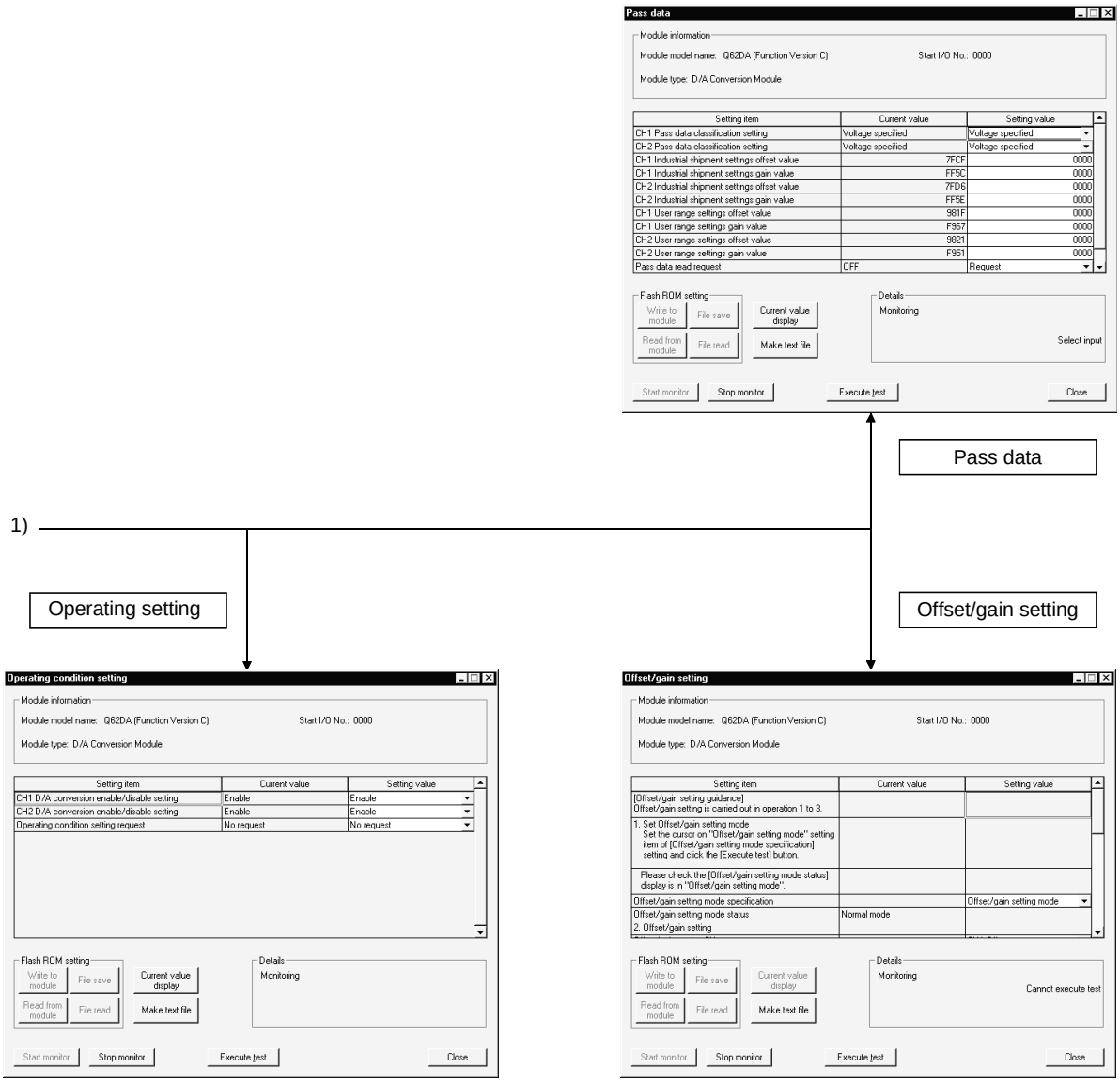
[Startup procedure]

Monitor/test module selection screen → "Start I/O No.*" → "Package name" → "Module model name" → Monitor/test

* Enter the start I/O numbers in hexadecimal.
  The screen can also be started from the GX Developer Version 6 or later system monitor.
  See GX Developer's operating manual for details.

[Setting screen]




Pass data
Module information
Module model name: Q62DA (Function Version C)
Start I/O No.: 0000
Module type: D/A Conversion Module
Setting item
Current value
Setting value
CH1 Pass data classification setting
Voltage specified
CH2 Pass data classification setting
CH1 Industrial shipment settings offset value
7FCF
0000
CH1 Industrial shipment settings gain value
FF5C
CH2 Industrial shipment settings offset value
7FD6
CH2 Industrial shipment settings gain value
FF5E
CH1 User range settings offset value
981F
CH1 User range settings gain value
F967
CH2 User range settings offset value
9821
CH2 User range settings gain value
F951
Pass data read request
OFF
Request
Flash ROM setting
Write to module
File save
Read from module
File read
Current value display
Make text file
Details
Monitoring
Select input
Start monitor
Stop monitor
Execute test
Close
Pass data
1)
Operating setting
Offset/gain setting
Operating condition setting
CH1 D/A conversion enable/disable setting
Enable
CH2 D/A conversion enable/disable setting
Operating condition setting request
No request
Offset/gain setting
[Offset/gain setting guidance]
Offset/gain setting is carried out in operation 1 to 3.
1. Set Offset/gain setting mode
Set the cursor on "Offset/gain setting mode" setting item of [Offset/gain setting mode specification] setting and click the [Execute test] button.
Please check the [Offset/gain setting mode status] display is in "Offset/gain setting mode".
Offset/gain setting mode specification
Offset/gain setting mode
Offset/gain setting mode status
Normal mode
2. Offset/gain setting
Cannot execute test

[Explanation of items]

(1) Contents of screen display

Setting item : Buffer memory name is displayed.
Current value : Current value of the buffer memory is monitored.
Setting value : Select or enter the data to be written into the buffer memory during test operation.

(2) Explanation of the command buttons

Current value	The current value of the selected item is displayed. (This is used to check text that cannot be displayed in the current value field. However, in this utility package, all items can be displayed in the display fields).
Make text file	Creates a file consisting of the screen contents in text file format.
Start monitor / Stop monitor	Selects whether or not the current value fields are monitored.
Execute test	Performs a test of the selected item. To select more than one item, select multiple items while holding down the Ctrl key.
Close	Closes the screen currently displayed and returns to the previously displayed screen.

POINT

(1) Turning the output enable/disable flag ON/OFF or writing the CH□ digital value during test operation changes the analog output, so perform these after taking ample safety precautions.

REMARK

The selection test operation is explained below using the CH1 digital value writing as an example.

(1) Change the setting value field for "Y01: CH1 output enable/disable flag" to "ON: enable."
At this point, the value is not yet written in the D/A converter module.

(2) Click and select the setting value field to be written in the D/A converter module. To write several data items at one time, perform the selection operation while holding down the Ctrl key.

(3) Click the Execute test to execute write operation.
Once writing has been completed, the value that was written will be displayed in the present value field.

5.6.2 Offset/gain setting operation (Function version C or later)

Perform the offset/gain setting operation in the following sequence.

(1) Switch to the offset/gain setting screen

Perform the operation in Section 5.6.1 to display the offset/gain setting screen.

(2) Switch to the offset/gain setting mode

Change the Setting value field of Offset/gain setting mode specification to "Offset/gain setting mode", and click the Execute test button to perform write. When write is completed, the indication in the Current value field of Offset/gain setting mode status changes to "Offset/gain setting mode".

(3) Adjustment of the offset value and gain value

(a) Select the channel for which the offset value is to be adjusted
Make the selection from the offset/gain setting CH field, and then click on the Execute test button.

(b) Adjust the analog output value
Select the adjustment amount in the offset/gain adjustment field, and then click on the Execute test button.
Perform this operation repeatedly to adjust the value to the desired offset value.

(c) Select the channel for which the gain value is to be adjusted
Select a channel in the offset/gain setting CH field, and then click on the Execute test button.

(d) Adjust the analog output value
Select the adjustment amount in the offset/gain adjustment field, and then click on the Execute test button.
Perform this operation repeatedly to adjust the value to the desired gain value.

(e) To set the offset/gain for more than one channel, repeat steps (a) to (d).

(4) Write the offset/gain setting values to the module

Write the offset/gain settings of the D/A converter module with the following procedure after completing the settings for all channels using the using range setting. Note that if settings are written while offset/gain settings are incomplete, the status at that point will be written to the module.

(a) Write to the D/A converter module
Select "Write requested" from the setting value field for the offset/gain setting write request, and then click on the Execute test button.

(b) Confirm execution of write operation
Confirm that the present value field display for the offset/gain module write request changes from "Write request" to "No write request".

(c) Error handling

Confirm that the ERROR LED for the D/A converter module is off. If the ERROR LED is lit, click on Close , check the error code on the monitor screen, and then perform the offset/gain settings again.

(5) Switch to the normal mode

Change the Setting value field of Offset/gain setting mode specification to "Normal mode", and click the Execute test button to perform write.

When write is completed, the indication in the Current value field of Offset/gain setting mode status changes to "Normal mode".

5.6.3 Offset/gain setting operation (Function version B or earlier)

Perform the offset/gain setting operation in the following sequence.

(1) Switch to the offset/gain setting mode

Change switch 4 for intelligent function module switch setting to the offset/gain setting mode (see Section 4.5).

(2) Switch to the offset/gain setting screen

Display the offset/gain setting screen using the operation described in Section 5.6.1.

(3) Adjustment of the offset value and gain value

(a) Select the channel for which the offset value is to be adjusted

Make the selection from the offset/gain setting CH field, and then click on the Execute test button.

(b) Adjust the analog output value

Select the adjustment amount in the offset/gain adjustment field, and then click on the Execute test button.

Perform this operation repeatedly to adjust the value to the desired offset value.

(c) Select the channel for which the gain value is to be adjusted

Select a channel in the offset/gain setting CH field, and then click on the Execute test button.

(d) Adjust the analog output value

Select the adjustment amount in the offset/gain adjustment field, and then click on the Execute test button.

Perform this operation repeatedly to adjust the value to the desired gain value.

(e) To set the offset/gain for more than one channel, repeat steps (a) to (d).

(4) Write the offset/gain setting values to the module

Write the offset/gain settings to the D/A converter module with the following procedure after completing the settings for all channels using the user range setting. Note that if settings are written while offset/gain settings are incomplete, the status at that point will be written to the module.

(a) Write to the D/A converter module

Select "Write requested" from the setting value field for the offset/gain setting write request, and then click on the Execute test button.

(b) Confirm execution of write operation

Confirm that the present value field display for the offset/gain module write request changes from "Write request" to "No write request".

(c) Error handling

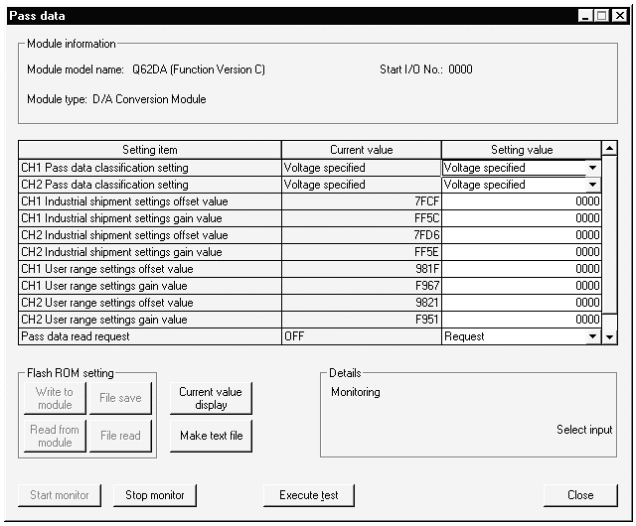
Confirm that the ERROR LED for the D/A converter module is off. If the ERROR LED is lit, click on Close, check the error code on the monitor screen, and then perform the offset/gain settings again.

5.6.4 Pass data (Q62DA/Q64DA)

Perform operation in the following sequence to save/restore the user range.

(1) Switch to the pass data screen

Perform the operation in Section 5.6.1 to display the Pass data screen.



(2) User range saving

(a) Set "Voltage specified" or "Current specified" in the Setting value field of Pass data classification setting, and click the Execute test button.

When the setting is completed, the set data is displayed in the Current value field of CH□ Pass data classification setting.

(b) Change the Setting value field of Pass data read request to "Request", and click the Execute test button.

When read is completed, the values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ User range settings offset/gain values.

(c) Compare the values with those in the range reference table, and record them if they are correct.
Refer to Section 7.4 for the range reference table.

(3) User range restoration

(a) Set "Voltage specified" or "Current specified" in the Setting value field of Pass data classification setting, and click the Execute test button.

When the setting is completed, the set data is displayed in the Current value field of CH□ Pass data classification setting.

(b) Set the recorded values in the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values.

(c) Select all the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values, and click the Execute test button.

When write is completed, the set values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ User range settings offset/gain values.

(d) Change the Setting value field of Pass data write request to "Request", and click the Execute test button.

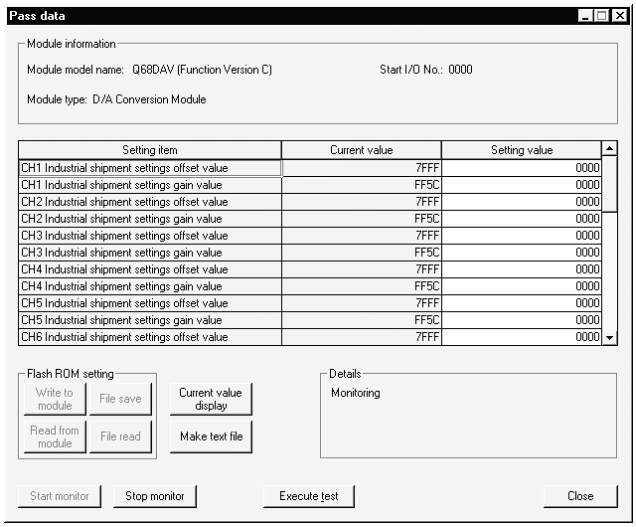
Make sure that the indication in the Current value field of Pass data write request changes from "Request" to "OFF" on completion of write.

5.6.5 Pass data (Q68DAV/Q68DAI)

Perform operation in the following sequence to save/restore the user range.

(1) Switch to the Pass data screen

Perform the operation in Section 5.6.1 to display the pass data screen.



(2) User range saving

(a) Change the Setting value field of Pass data read request to "Request", and click the Execute test button.

When read is completed, the values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ user range settings offset/gain values.

(b) Compare the values with those in the range reference table, and record them if they are correct.
Refer to Section 7.4 for the range reference table.

(3) User range restoration

(a) Set the recorded values in the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values.

(b) Select all the Setting value fields of CH□ Industrial shipment settings offset/gain values/user range settings offset/gain values, and click the Execute test button.

When write is completed, the set values are displayed in the Current value fields of CH□ Industrial shipment settings offset/gain values/CH□ user range settings offset/gain values.

(c) Change the Setting value field of Pass data write request to "Request", and click the Execute test button.

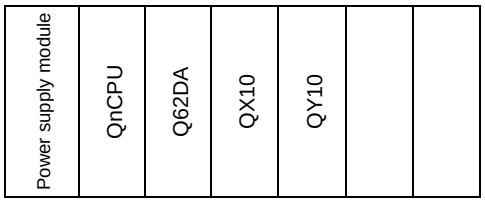
Make sure that the indication in the Current value field of Pass data write request changes from "Request" to "OFF" on completion of write.

6 PROGRAMMING

Using a sample system configuration shown below, details of the D/A converter module program are explained in the following two scenarios: when the utility package is used and when the utility package is not used.

System configuration used in the program explanation

(1) System configuration



(2) Program conditions

If a digital value writing error occurs while a digital value is being written into the CH1 or CH2 digital value area for Q62DA, read the error code.

(a) Contents of initial setting

- Analog output enabled channel ····· CH1 and CH2

(b) Devices used by the user

- Output enable ····· X10
- Digital value write signal ····· X11
- Error code reset signal ····· X12
- Error code display (3-digit BCD) ····· Y20 to Y2B
- CH1 digital value ····· D11
- CH2 digital value ····· D12
- Error code ····· D13

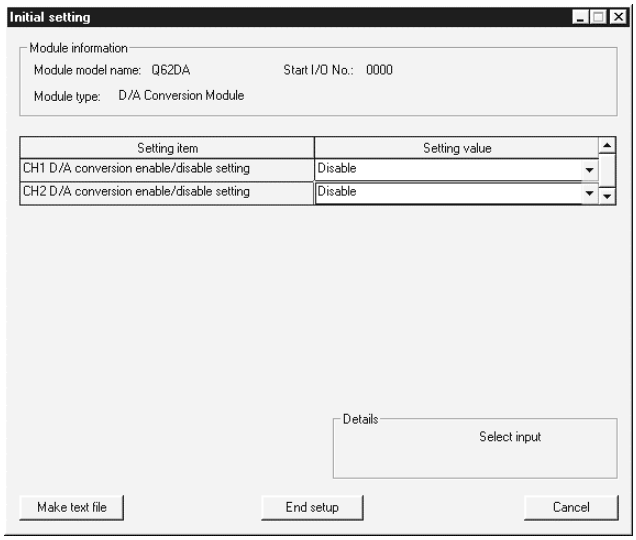
6 - 1

6.1 Programming Example Using the Utility Package

6.1.1 Operating the utility package

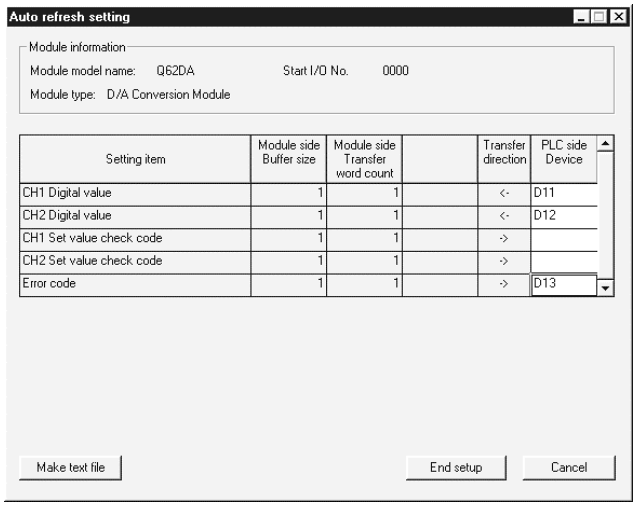
(1) Initial setting (see Section 5.4.)

Set the D/A conversion enable/disable setting for CH1 and CH2, to Enable.



(2) Automatic refresh setting (see Section 5.5.)

Set the device to store the Digital value and Set value check code for CH1 and CH2, and the Error code.

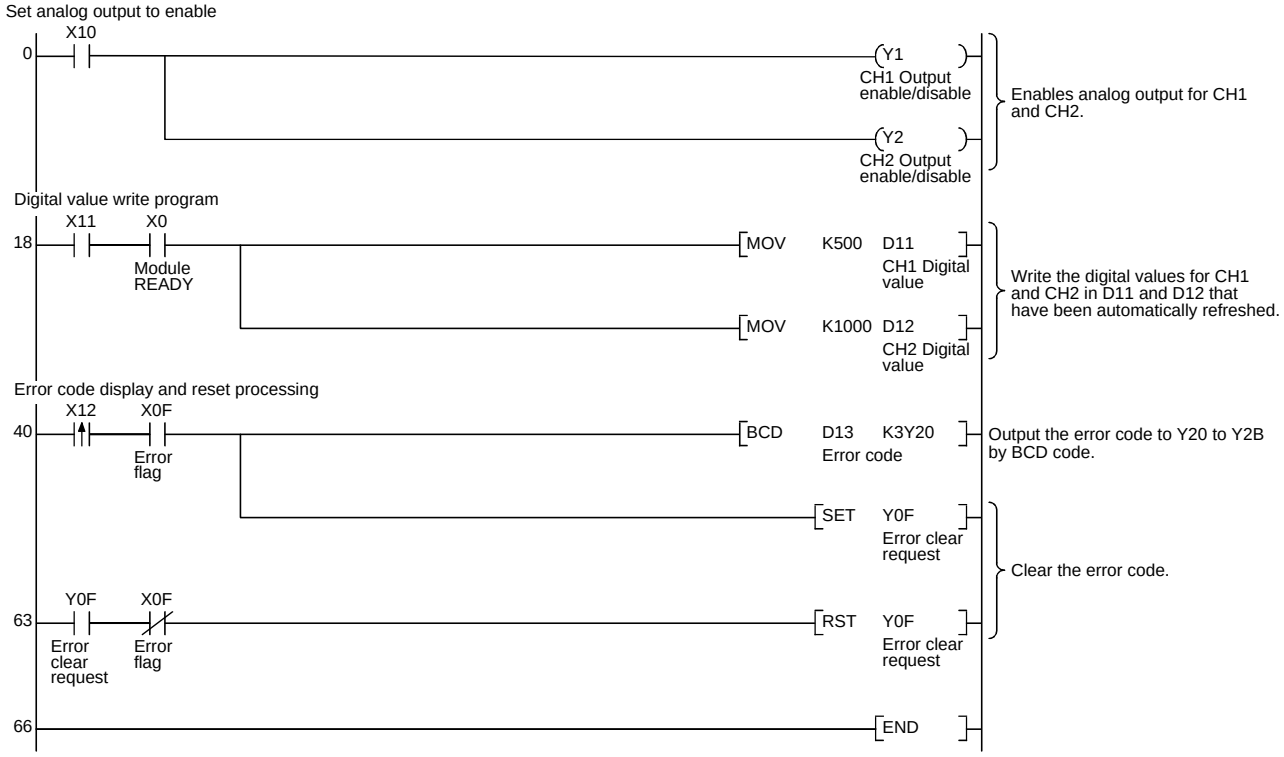


(3) Writing the intelligent function module parameters (see Section 5.3.3)

Write the intelligent function module parameters to the CPU module.

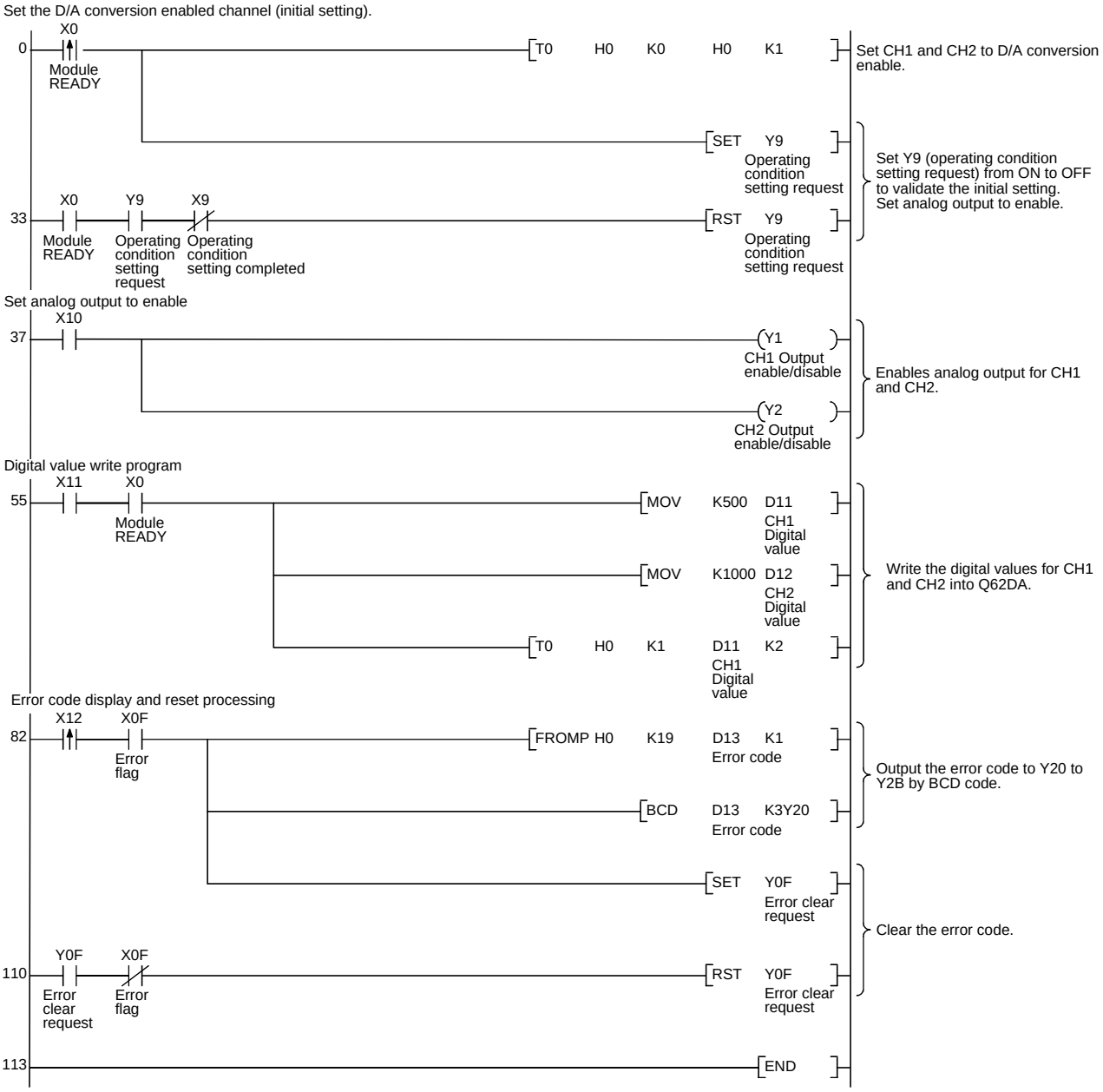
This operation is performed using the parameter setting module selection screen.

6.1.2 Programming example

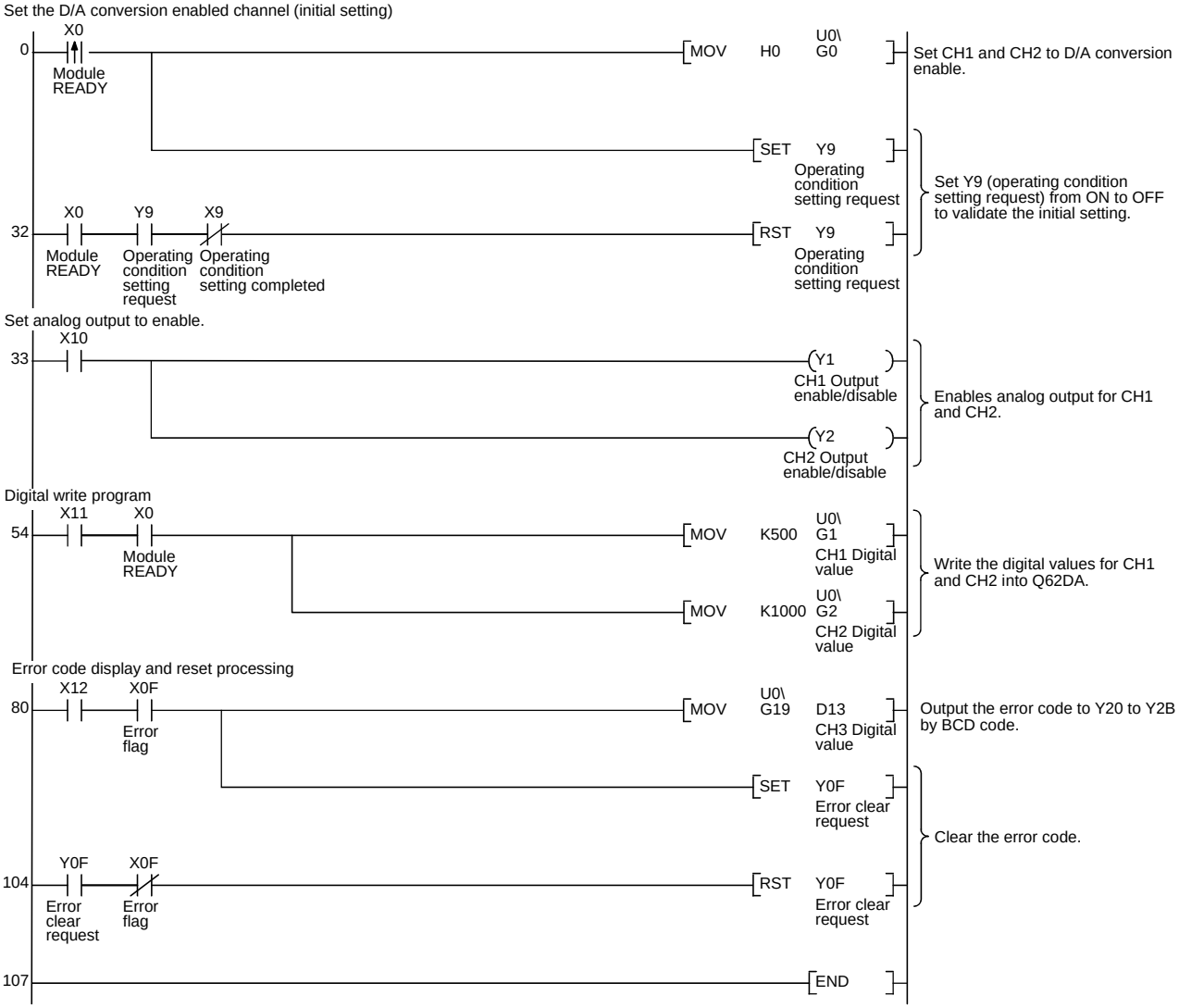


6.2 Programming Example without Using the Utility Package

(1) Programming example using the FROM/TO commands



(2) Programming example using the intelligent function module device (U□\G□)



7 ONLINE MODULE CHANGE

This chapter describes the specifications of an online module change.

(1) Perform an online module change by operating GX Developer.

(2) To ensure ease of offset/gain re-setting, there is a user range save/restoration function that is performed by executing the dedicated instruction or read/write from/to buffer memory.

POINT

- Perform an online module change after making sure that the system outside the PLC will not malfunction.
- To prevent an electric shock or like, always switch OFF the external power of the module that will be changed online.
- After the module has failed, data may not be saved properly. Referring to Section 3.4.15, therefore, prerecord the data to be saved (offset/gain values of the industrial shipment settings and user range settings in the buffer memory).

(Note)
The dedicated instruction cannot be executed during an online module change. When using the dedicated instruction to execute save/restoration, therefore, execute save/restoration in the other system.
If the other system is unavailable, execute restoration by performing write to the buffer memory.

7.1 Online Module Change Conditions

The CPU, D/A converter module, GX Developer and base unit given below are needed to perform an online module change.

(1) CPU

The Q12PHCPU or Q25PHCPU is needed. Note that it cannot be used on the remote I/O station of the MELSECNET/H.
For precautions for multiple PLC system configuration, refer to the Process CPU User's Manual (Function Explanation/Program Fundamentals).

(2) D/A converter module

The module of function version C or later is necessary.

(3) GX Developer

GX Developer of Version 7.10L or later is necessary.

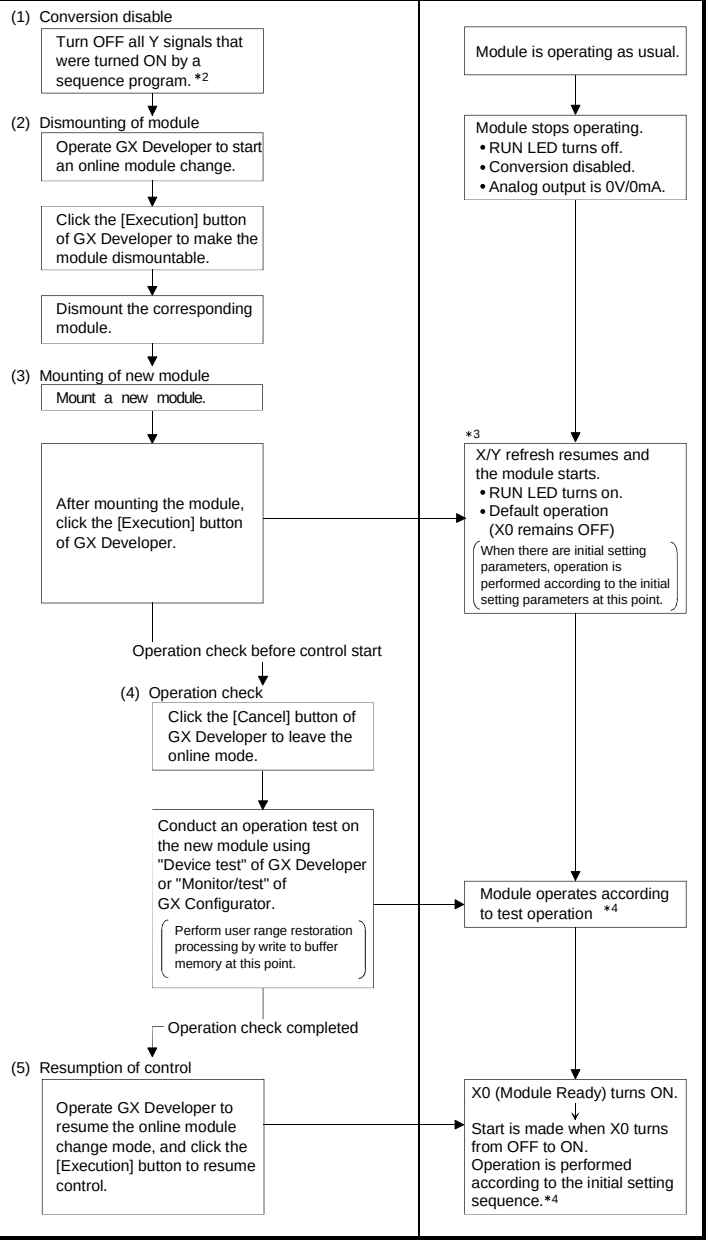
(4) Base unit

1) For an online module change, use the main base unit and Q6□B extension base unit.
The module installed on the main base unit or Q6□B extension base unit can be change online.
2) The module installed on the Q5□B extension base unit cannot be changed online.
When the Q5□B is in use, the module installed on the main base unit cannot be changed online, either.

7.2 Online Module Change Operations

The following gives the operations performed for an online module change.

CPU operation ○: Executed ×: Not executed						(User operation)	(Intelligent function module operation)
				GX Configurator			
X/Y refresh	FROM/TO instruction ＊1	Dedicated instruction	Device test	Initial setting parameter	Monitor/ test		
○	○	○	○	×	○		
×	×	×	×	×	×		
○	×	×	×	○	×		
○	×	×	○	×	○		
○	○	○	○	×	○		



＊1: Access to the intelligent function module device (U□\G□) is included.

＊2: Operating the intelligent function module switches (＊3) starts the module and resumes X/Y refresh. When there are initial setting parameters, operation is performed according to the initial setting parameters.
Hence, if the Y signals are not turned OFF, analog outputs will be provided at this point. Therefore, always turn OFF the Y signals that were turned ON by the sequence program.

＊4: In the absence of the operation marked ＊4, the operation of the intelligent function module is the operation performed prior to that.

7.3 Online Module Change Procedure

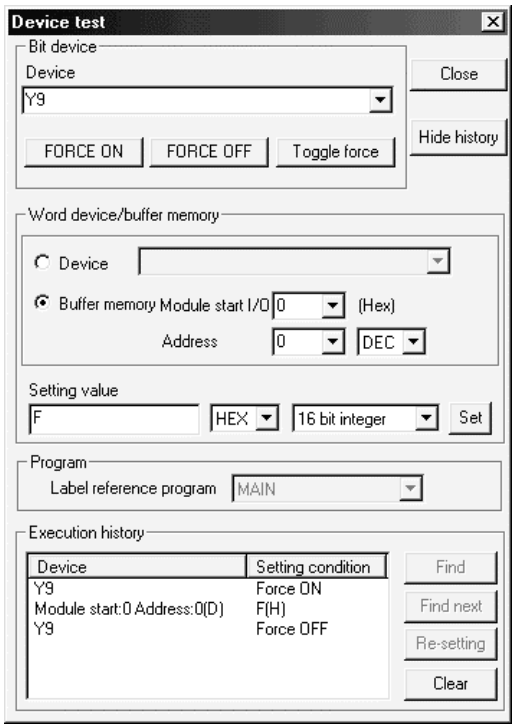
There are the following online module change procedures depending on whether the user range setting has been made or not, whether the initial setting of GX Configurator-DA has been made or not, and whether the other system exists or not.

Range setting	Initial setting	Other system	Reference section
Industrial shipment setting	GX Configurator-DA	—	Section 7.3.1
Industrial shipment setting	Sequence program	—	Section 7.3.2
User range setting	GX Configurator-DA	Present	Section 7.3.3
User range setting	GX Configurator-DA	Absent	Section 7.3.4
User range setting	Sequence program	Present	Section 7.3.5
User range setting	Sequence program	Absent	Section 7.3.6

7.3.1 When industrial shipment setting is used and initial setting was made with GX Configurator-DA

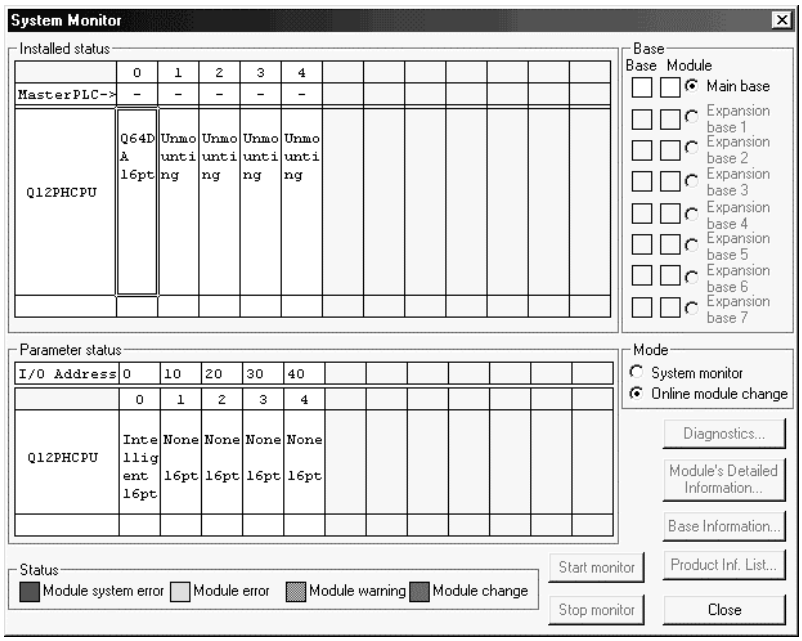
(1) Conversion disable

(a) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.

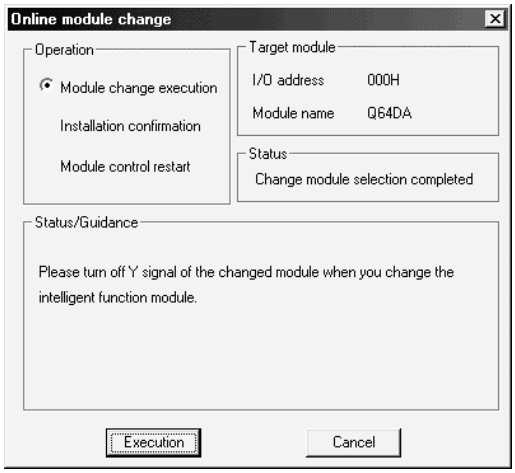


(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the [OK] button, dismount the module as-is, and mount a new module.

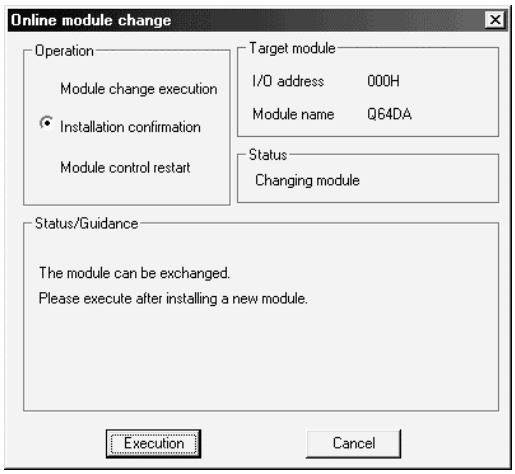
(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT
Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

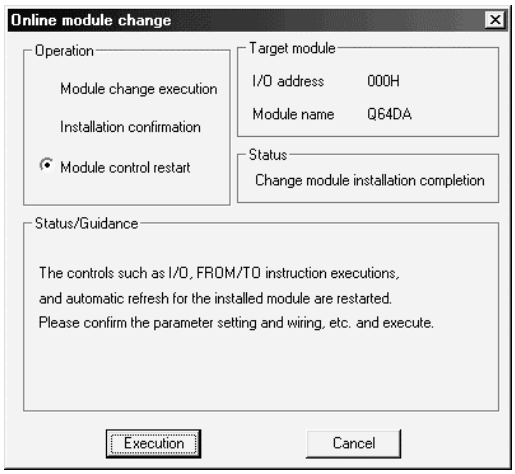
(a) Mount a new module to the same slot and install the terminal block.

(b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

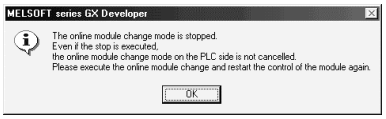


(4) Operation check

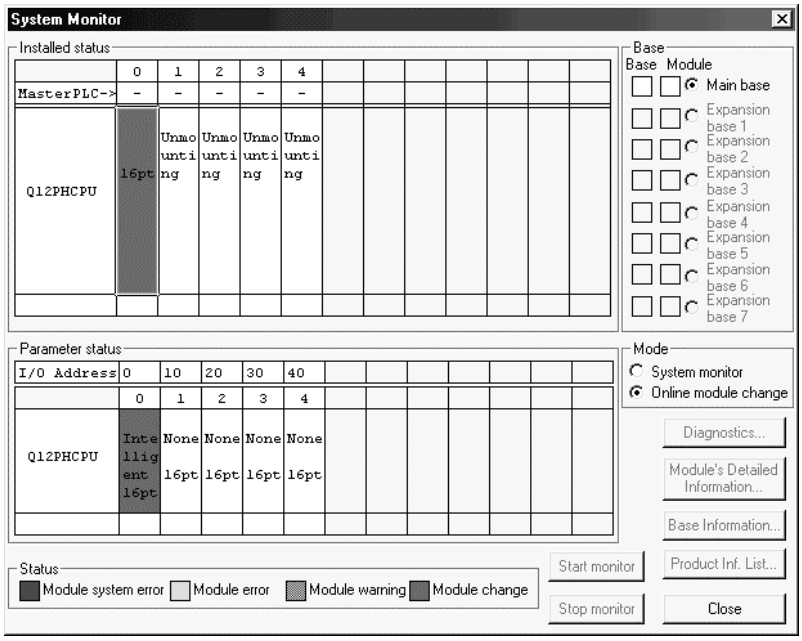
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(b) Click the [OK] button to leave the "Online module change" mode.



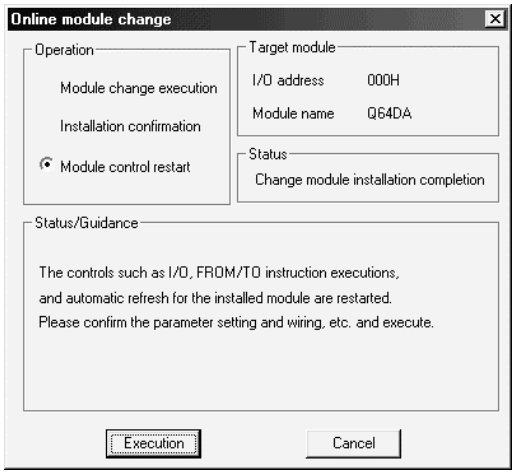
(c) Click the [Close] button to close the System monitor screen.



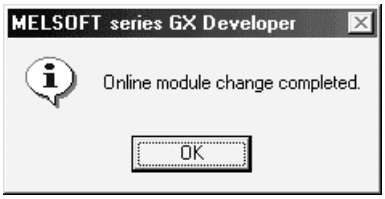
(d) Set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



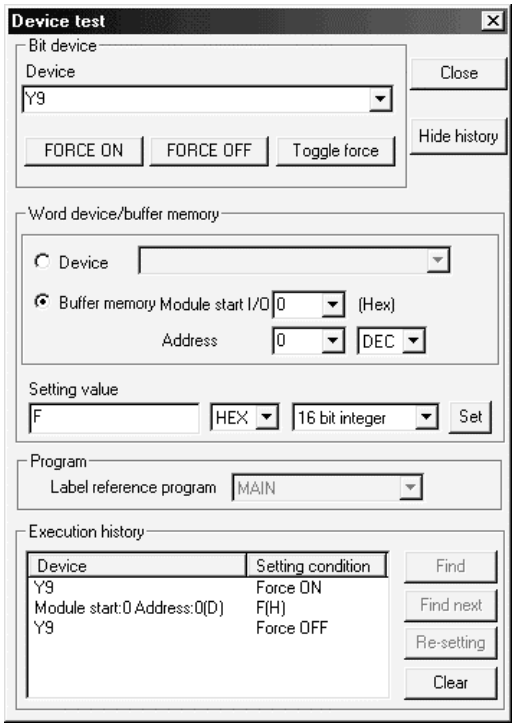
(b) The "Online module change completed" screen appears.



7.3.2 When industrial shipment setting is used and initial setting was made with sequence program

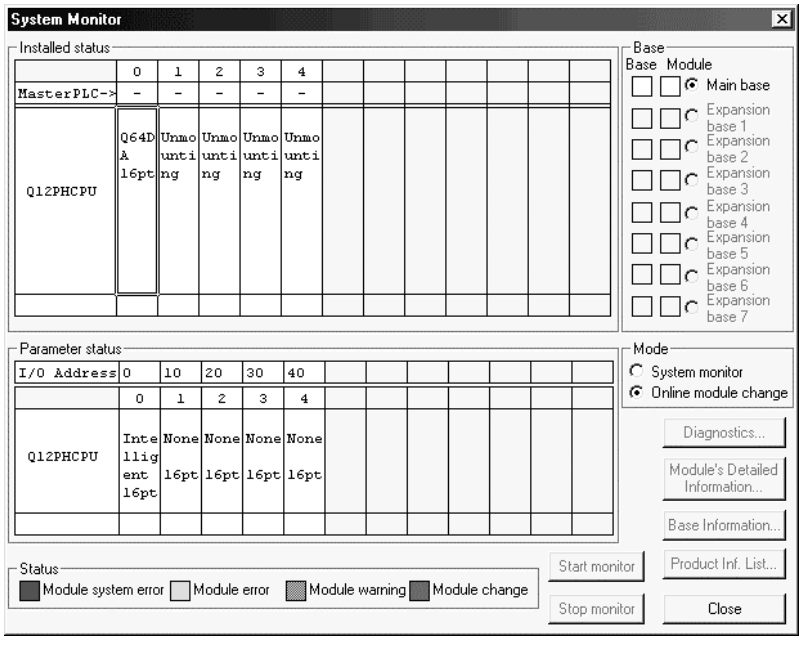
(1) Conversion disable

(a) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.

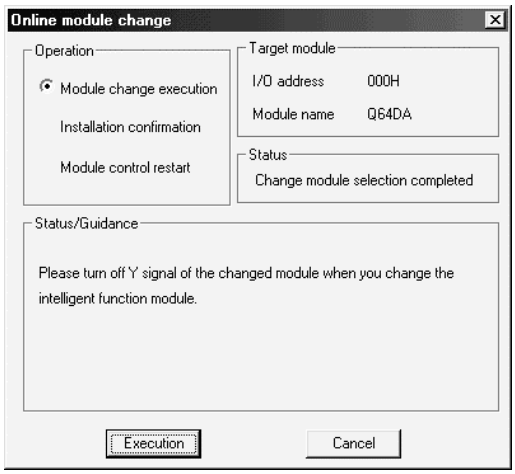


(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the [OK] button, dismount the module as-is, and mount a new module.

(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

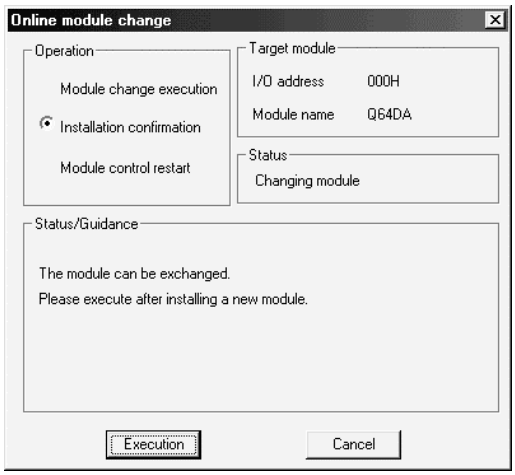
POINT

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

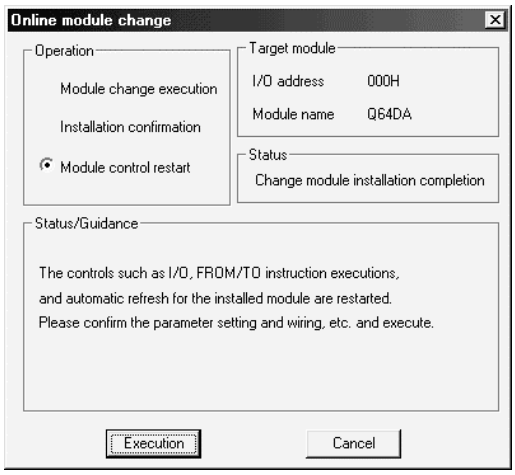
(a) Mount a new module to the same slot and install the terminal block.

(b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

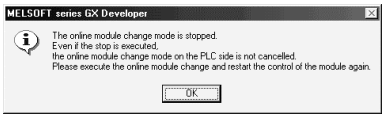


(4) Operation check

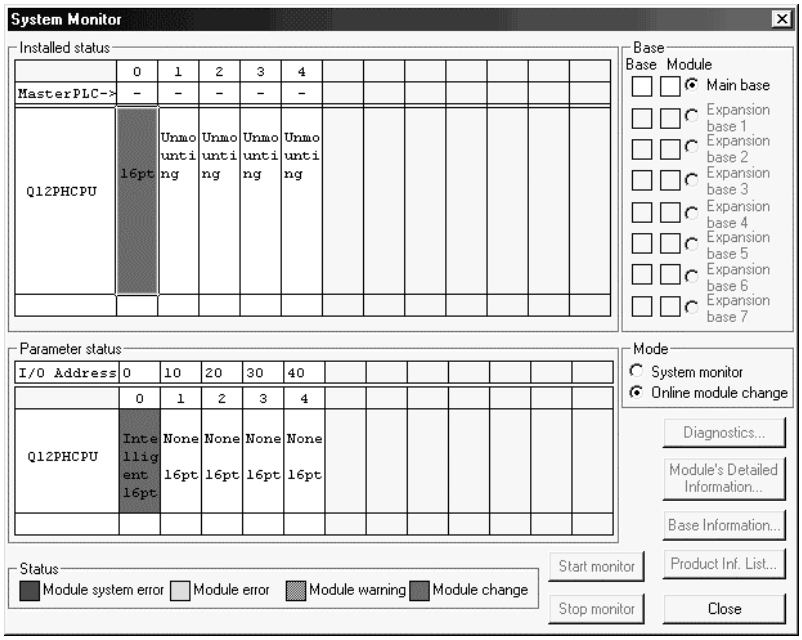
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(b) Click the [OK] button to leave the "Online module change" mode.



(c) Click the [Close] button to close the System monitor screen.

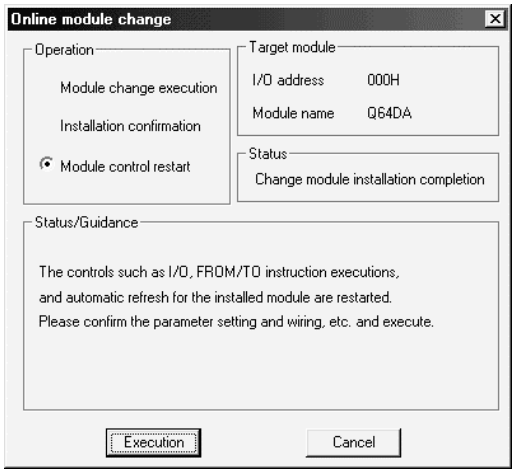


(d) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

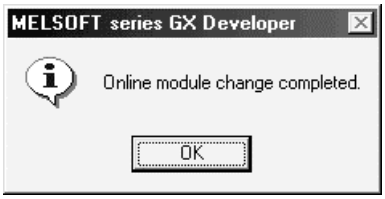
(e) Executing module control resumption resumes control according to the contents of the initial setting program. Make sure that the contents of the initial setting program are correct.

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



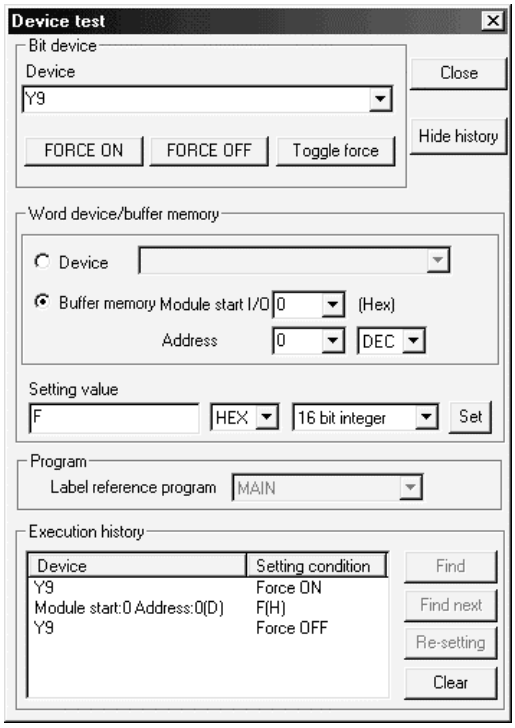
(b) The "Online module change completed" screen appears.



7.3.3 When user range setting is used and initial setting was made with GX Configurator-DA (other system is available)

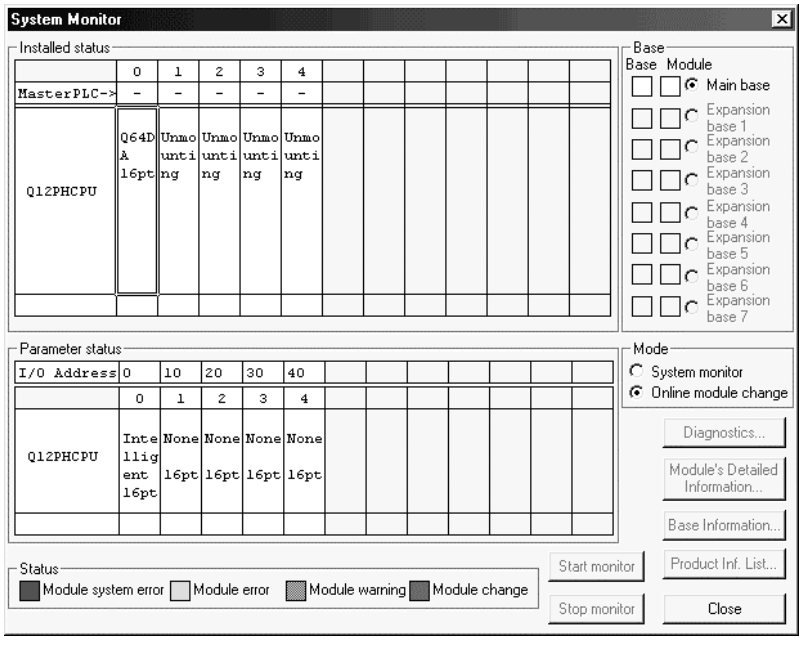
(1) Conversion disable

(a) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.

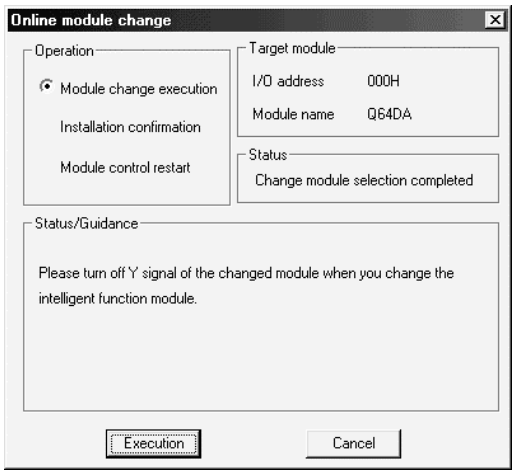


(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section 7.3.4 (2)(c) and later.

(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT
Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

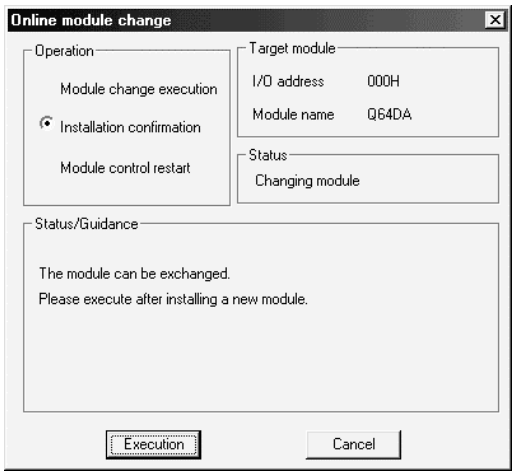
(a) Mount the dismounted module and new module to the other system.

(b) Using the G.OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 2.2 for the G.OGLOAD instruction.

(c) Using the G.OGSTOR instruction, restore the user set values to the module. Refer to Appendix 2.3 for the G.OGSTOR instruction.

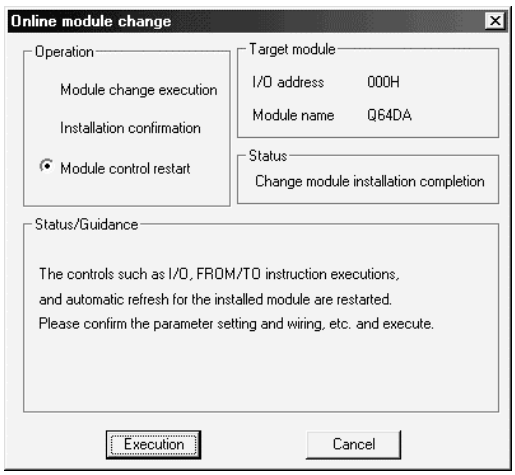
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the terminal block.

(e) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

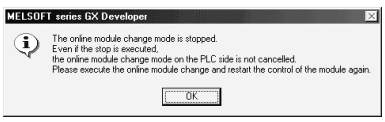


(4) Operation check

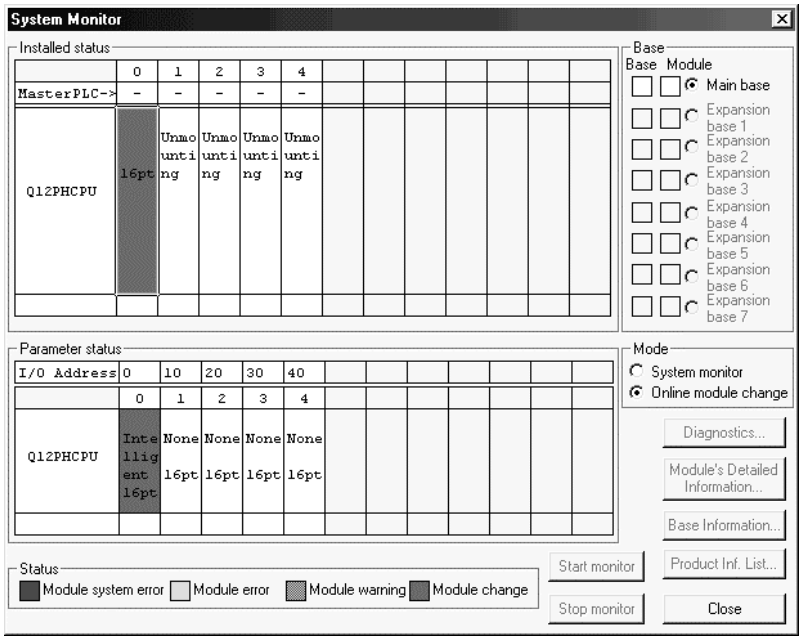
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(b) Click the [OK] button to leave the "Online module change" mode.



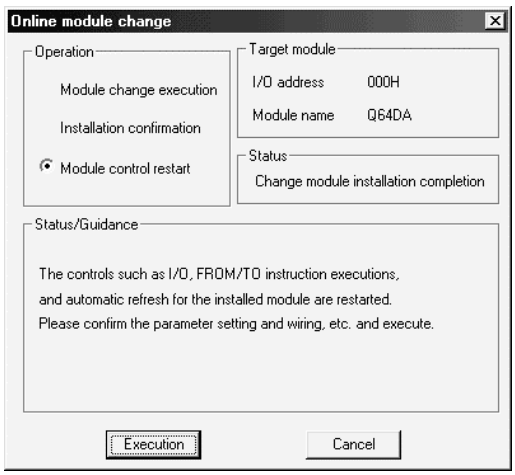
(c) Click the [Close] button to close the System monitor screen.



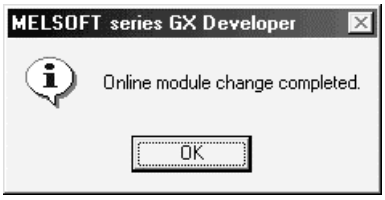
(d) Set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



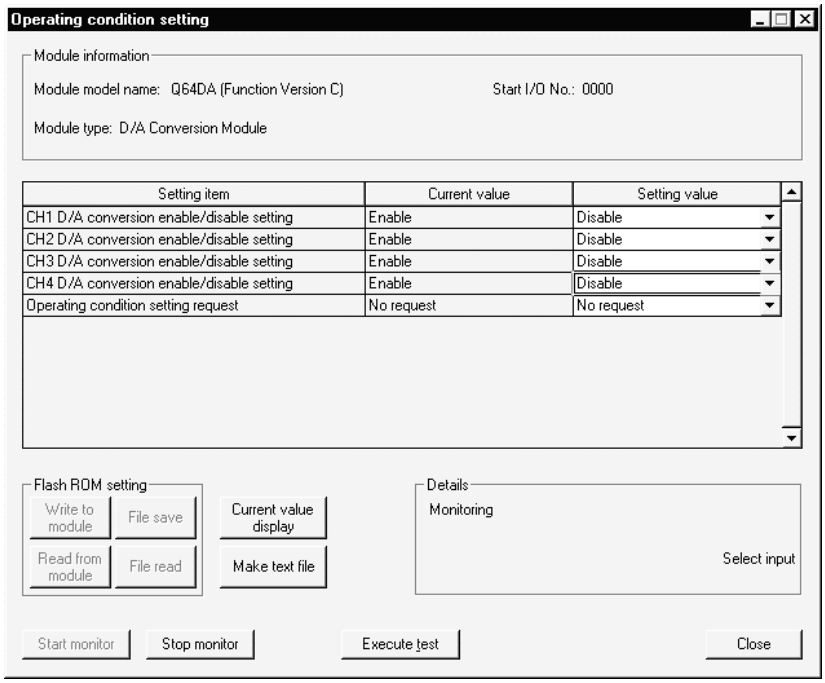
(b) The "Online module change completed" screen appears.



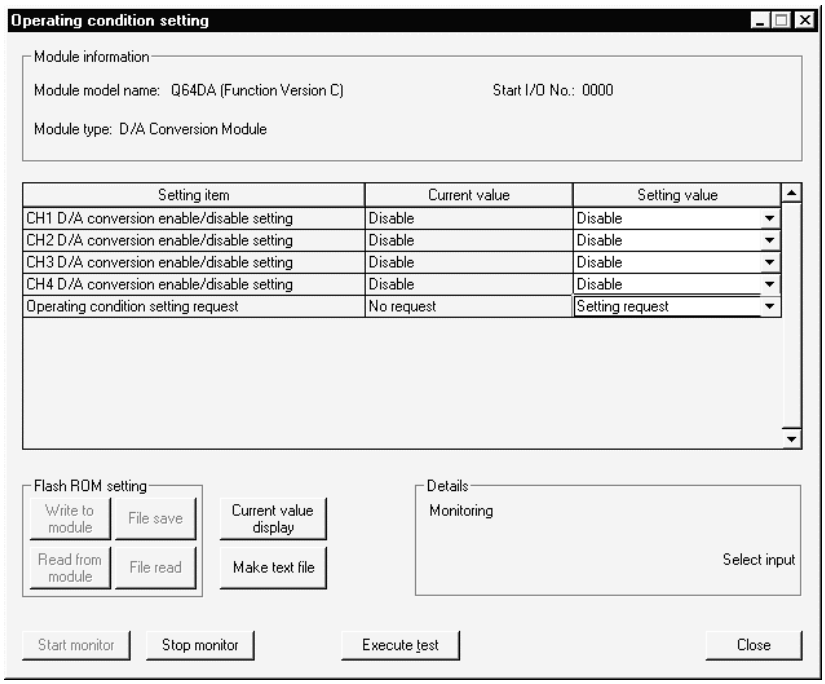
7.3.4 When user range setting is used and initial setting was made with GX Configurator-DA (other system is unavailable)

(1) Conversion disable

(a) On the Operating condition setting screen of GX Configurator-DA, set "Disable" in the Setting value field of CH□ D/A conversion enable/disable setting, and click the [Execute test] button.



(b) After making sure that the indication in the Current value field of CH□ D/A conversion enable/disable setting is "Disable", change the Setting value field of Operating condition setting request to "Setting request", and click the [Execute test] button to stop conversion.



(c) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.

1) Display the pass data screen of GX Configurator-DA.
2) Set the pass data classification setting* and make a pass data read request. (Refer to Section 5.6.4, 5.6.5.)
3) Compare the current values of the industrial shipment settings and user range settings offset/gain values with those of the range reference table. Refer to Section 7.4 for the range reference table.
4) If the values are proper, record the offset/gain values of the pass data classification setting, industrial shipment settings and user range settings.

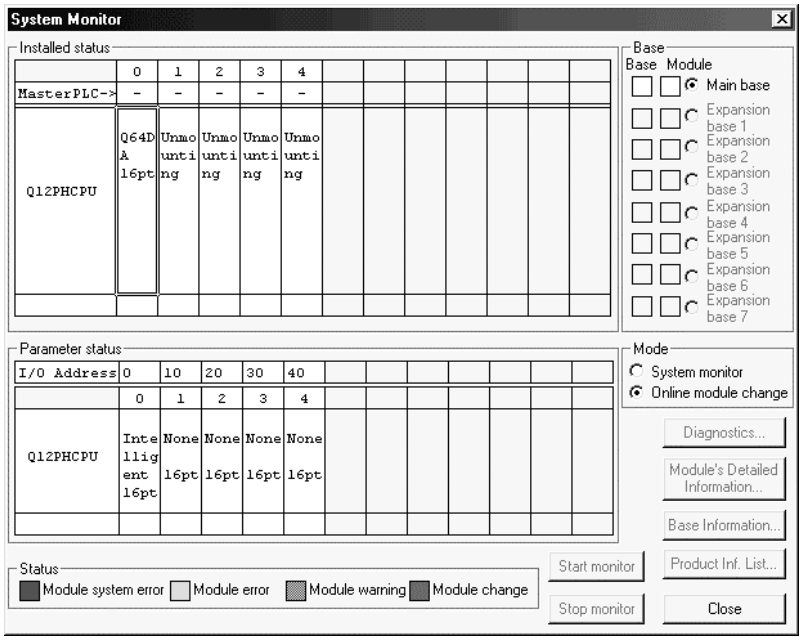
*: The Q68DAV/Q68DAI does not require the setting and recording of the pass data classification setting.

POINT

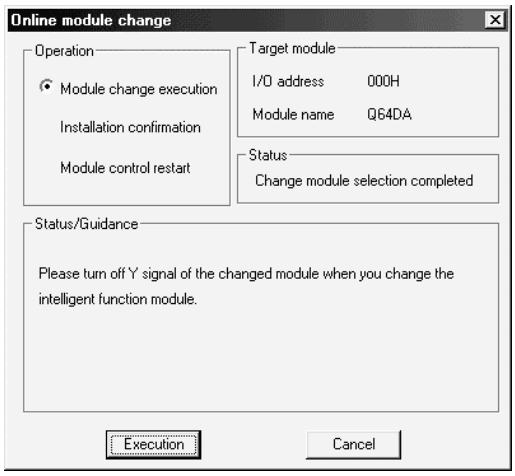
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, make offset/gain setting in the GX Configurator-DA. (see Section 5.6.2)
Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.

(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section (2)(c) and later.

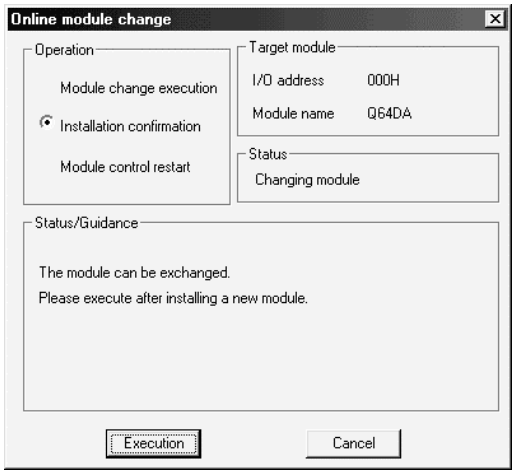
(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT
Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

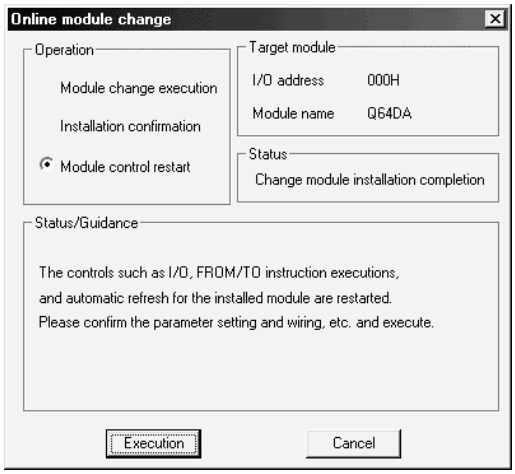
(a) Mount a new module to the same slot and install the terminal block.

(b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

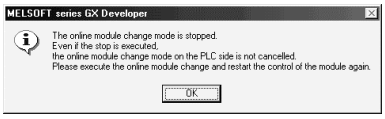


(4) Operation check

(a) To make an operation check, click the [Cancel] button to cancel control resumption.

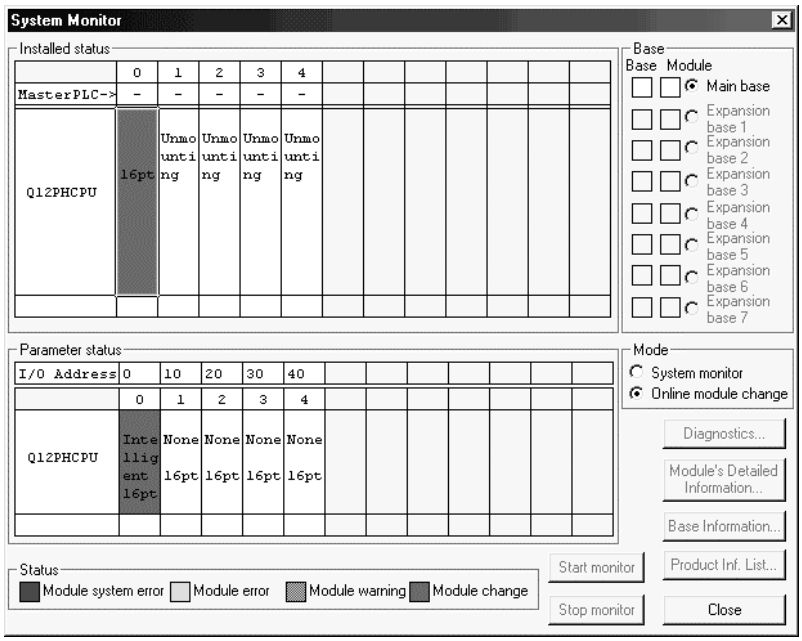


(b) Click the [OK] button to leave the "Online module change" mode.



7 - 19

(c) Click the [Close] button to close the System monitor screen.

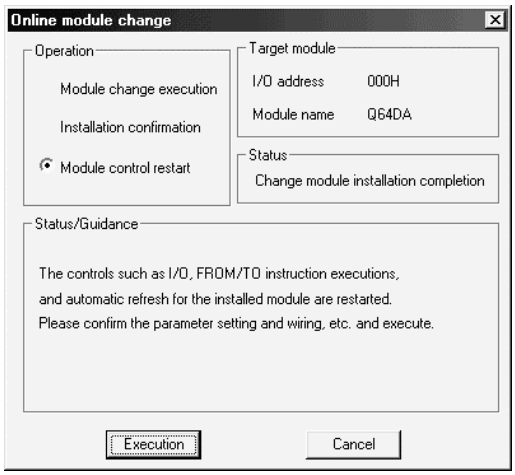


(d) On the pass data screen of GX Configurator-DA, set the prerecorded values and make a pass data write request. (Refer to Section 5.6.4, 5.6.5.)

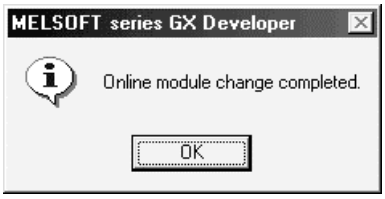
(e) Set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8) and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



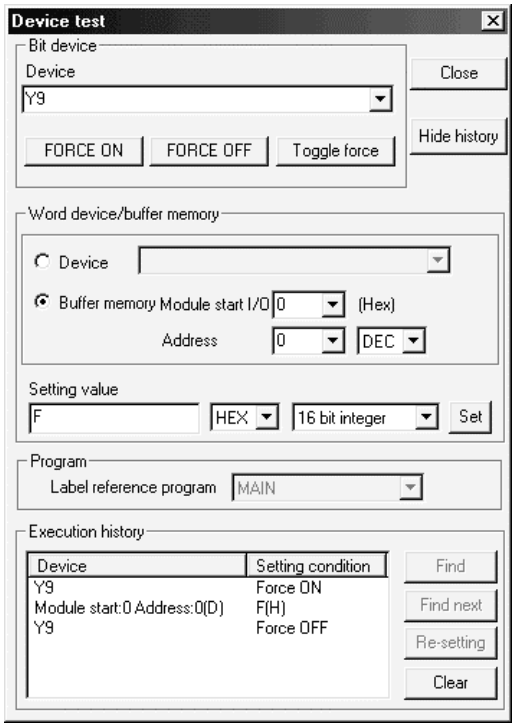
(b) The "Online module change completed" screen appears.



7.3.5 When user range setting is used and initial setting was made with sequence program (other system is available)

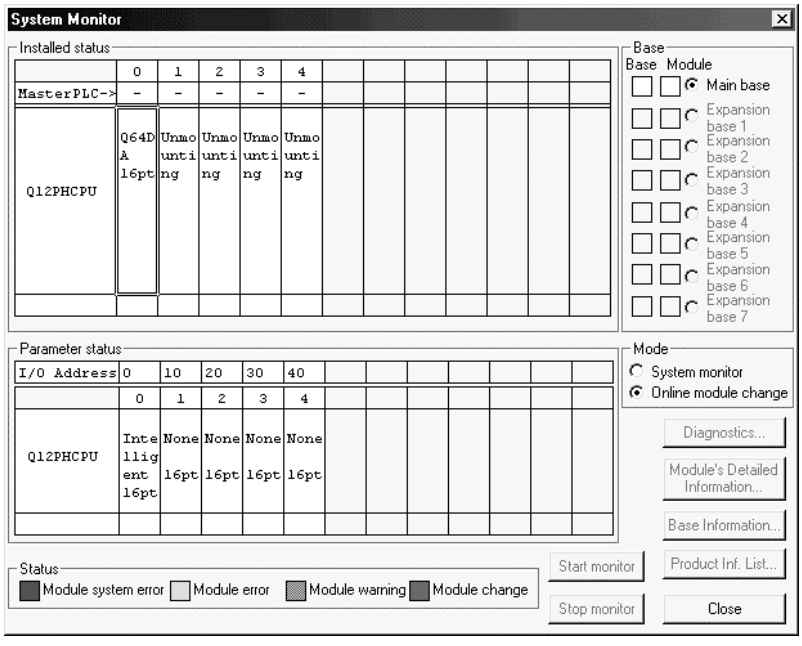
(1) Conversion disable

(a) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.

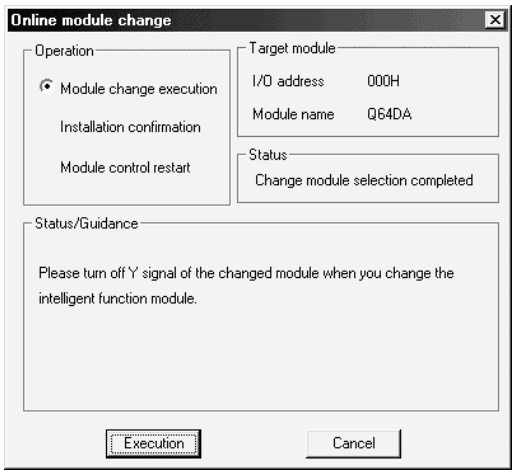


(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved. Click the [OK] button, and perform the operation in Section 7.3.6 (2)(c) and later.

(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT
Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

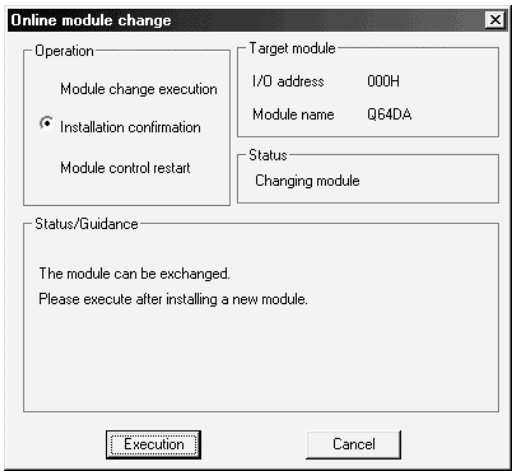
(a) Mount the dismounted module and new module to the other system.

(b) Using the G.OGLOAD instruction, save the user set values to the CPU device. Refer to Appendix 2.2 for the G.OGLOAD instruction.

(c) Using the G.OGSTOR instruction, restore the user set values to the module. Refer to Appendix 2.3 for the G.OGSTOR instruction.

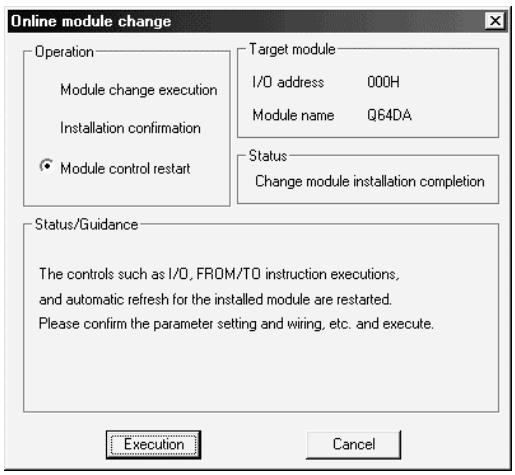
(d) Dismount the new module from the other system, mount it to the slot from where the old module was dismounted in the original system, and install the terminal block.

(e) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

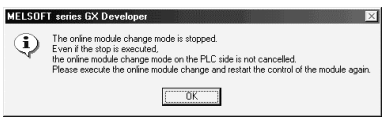


(4) Operation check

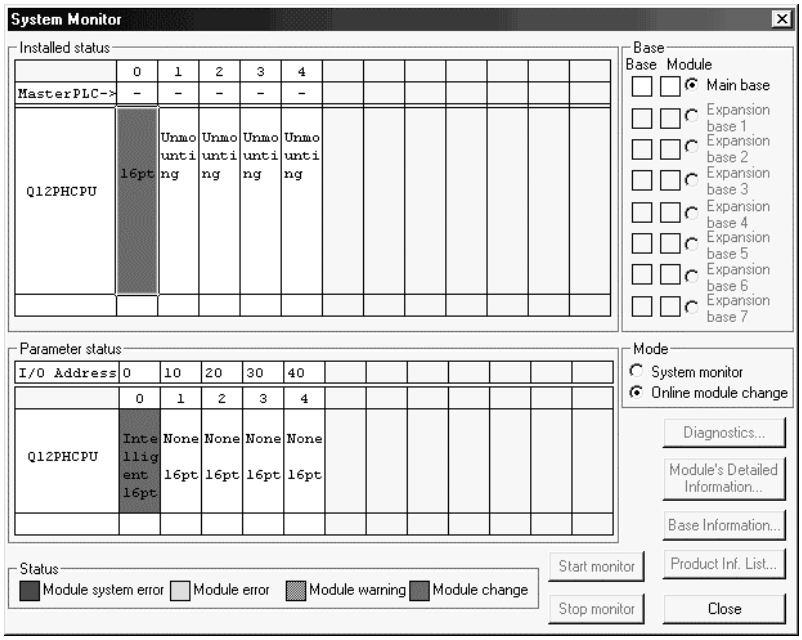
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(b) Click the [OK] button to leave the "Online module change" mode.



(c) Click the [Close] button to close the System monitor screen.

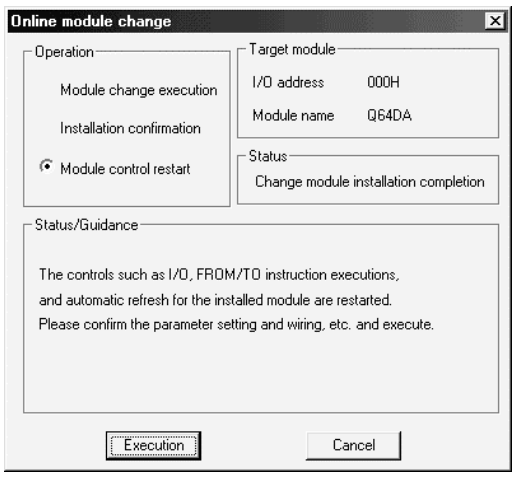


(d) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

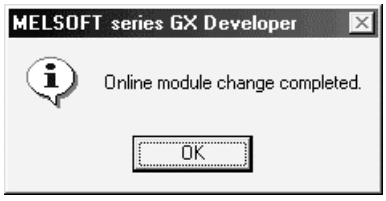
(e) Executing module control resumption resumes control according to the contents of the initial setting program. Make sure that the contents of the initial setting program are correct.

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



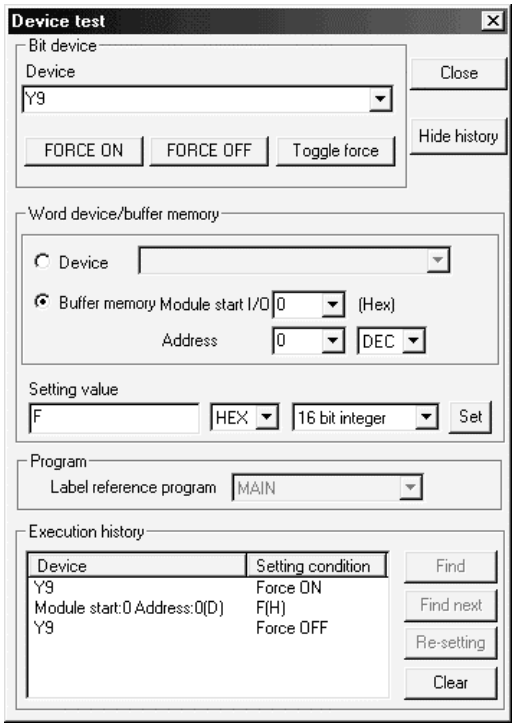
(b) The "Online module change completed" screen appears.



7.3.6 When user range setting is used and initial setting was made with sequence program (other system is unavailable)

(1) Conversion disable

(a) Set D/A Conversion enable/disable (buffer memory address 0: Un\G0) for all channel conversion disable and turn Operating condition setting request (Y9) from OFF to ON to stop conversion.



(b) If the saved buffer memory contents are not yet prerecorded, record them in the following procedure.

1) Make the pass data classification setting * (buffer memory address 200: Un\G200).
2) Turn Operation Condition Setting Request (Y9) from OFF to ON.
3) Compare the offset/gain values of the industrial shipment settings and user range settings (buffer memory addresses 202 to 233: Un\G202 to Un\G233) with the range reference table. Refer to Section 7.4 for the range reference table.
4) If the values are proper, record the offset/gain values of the pass data classification setting *, industrial shipment settings and user range settings.

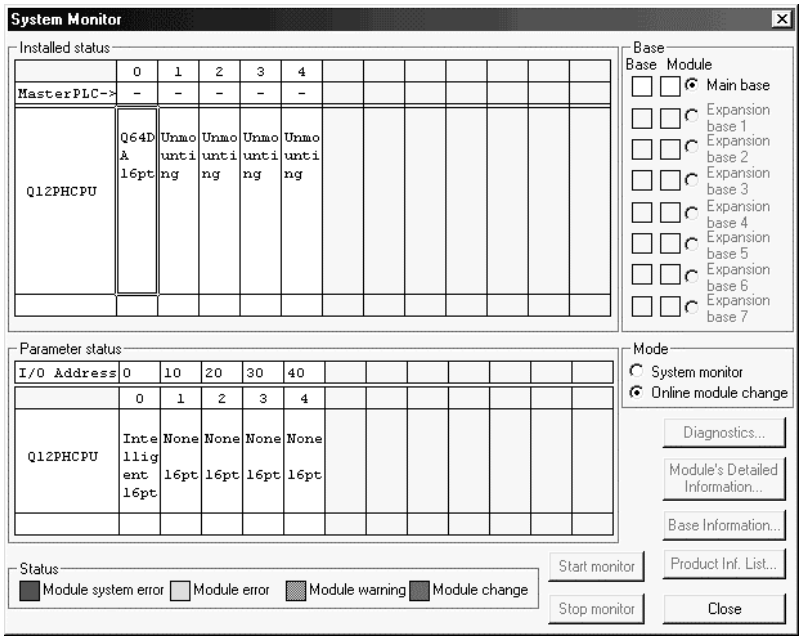
*: The Q68DAV/Q68DAI does not require the setting and recording of the pass data classification setting.

POINT

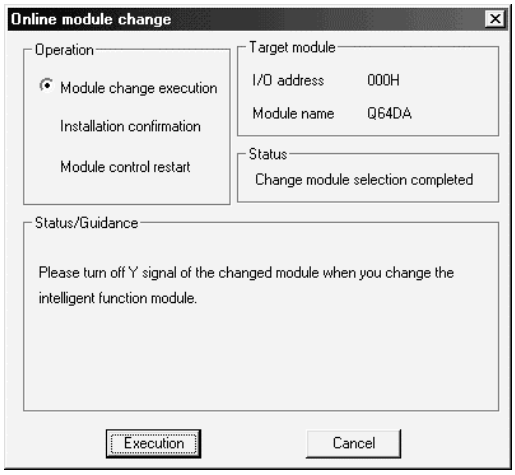
If the buffer memory values compared with the reference table are not proper, save and restoration of the user range cannot be executed.
Before executing module control resumption, follow the flowchart in Section 4.6 and make offset/gain setting in the device test of GX Developer.
Perform mode switching by making the setting of the mode switching setting (buffer memory addresses 158, 159: Un\G158, Un\G159) and turning Operation Condition Setting Request (Y9) from OFF to ON.
Note that if module control is resumed without offset/gain setting being made, operation will be performed with the default values.

(2) Dismounting of module

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



(b) Click the "Execution" button to enable a module change.



If the following error screen appears, the user range cannot be saved.
Click the [OK] button, and perform the operation in Section (2)(c) and later.

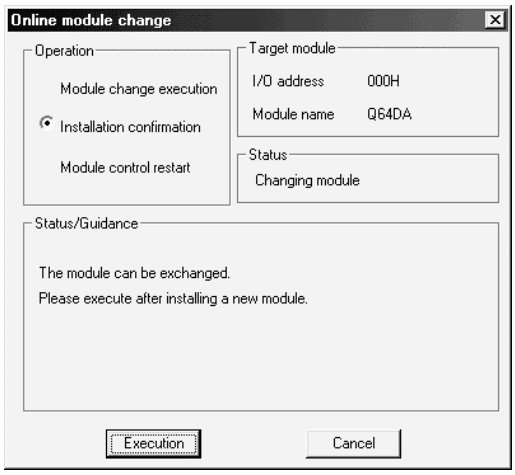
(c) After confirming that the "RUN" LED of the module has turned off, remove the terminal block and dismount the module.

POINT
Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

(3) Mounting of new module

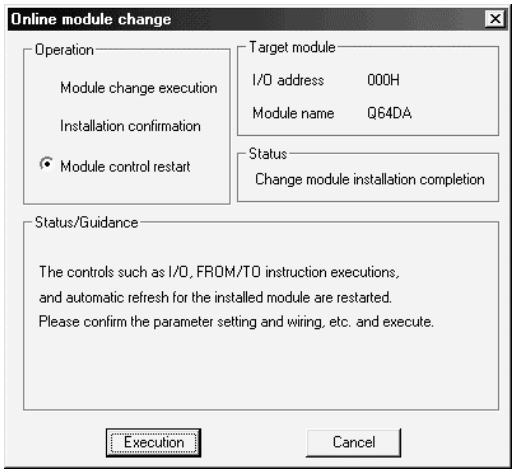
(a) Mount a new module to the same slot and install the terminal block.

(b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

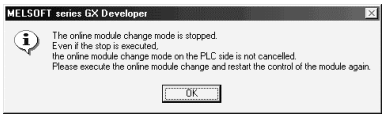


(4) Operation check

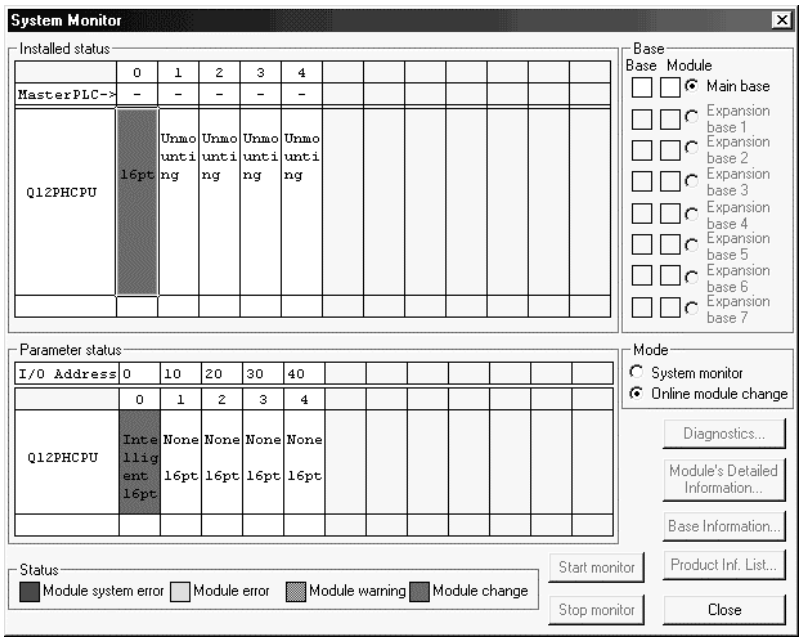
(a) To make an operation check, click the [Cancel] button to cancel control resumption.



(b) Click the [OK] button to leave the "Online module change" mode.



(c) Click the [Close] button to close the System monitor screen.



(d) Choose [Online] - [Debug] - [Device test] on GX Developer and set the prerecorded values to the buffer memory.

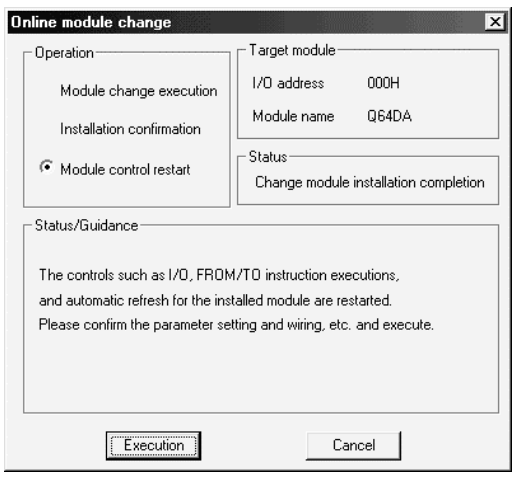
(e) Turn the user range write request (YA) from OFF to ON to restore the user set values to the module.

(f) Referring to (1), enable the conversion of the channels to be used, set digital values to the digital values (buffer memory addresses 1 to 8: Un\G1 to 8), and turn Operating condition setting request (Y9) from OFF to ON. Turn ON the output enable/disable flag (Y1 to Y8) of the used channel to check whether proper conversion has been made or not.
(Be careful since analog outputs are provided actually.)

(g) Executing module control resumption resumes control according to the contents of the initial setting program. Make sure that the contents of the initial setting program are correct.

(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



(b) The "Online module change completed" screen appears.

7.4 Range Reference Table

The range reference tables are given below.

(1) Reference table for offset/gain values of industrial shipment settings (buffer memory addresses 202 to 233: Un\G202 to 233)

(a) For Q62DA

The reference values change depending on the setting of the pass data classification setting (buffer memory address 200: Un\G200).

Address (Decimal)		Description	Pass data classification setting	Reference value (Hexadecimal)
CH1	CH2			
202	204	Industrial shipment settings offset value	Voltage specified	Approx. 7FF8H
			Current specified	Approx. 7FF8H
203	205	Industrial shipment settings gain value	Voltage specified	Approx. FF5AH
			Current specified	Approx. F92EH

(b) For Q64DA

The reference values change depending on the setting of the pass data classification setting (buffer memory address 200: Un\G200).

Address (Decimal)				Description	Pass data classification setting	Reference value (Hexadecimal)
CH1	CH2	CH3	CH4			
202	204	206	208	Industrial shipment settings offset value	Voltage specified	Approx. 7FF8H
					Current specified	Approx. 7FF8H
203	205	207	209	Industrial shipment settings gain value	Voltage specified	Approx. FF5AH
					Current specified	Approx. F92EH

(c) For Q68DAV

Address (Decimal)								Description	Reference value (Hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8		
202	204	206	208	210	212	214	216	Industrial shipment settings offset value	Approx. 7FF8H
203	205	207	209	211	213	215	217	Industrial shipment settings gain value	Approx. FF5AH

(d) For Q68DAI

Address (Decimal)								Description	Reference value (Hexadecimal)
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8		
202	204	206	208	210	212	214	216	Industrial shipment settings offset value	Approx. 7FF8H
203	205	207	209	211	213	215	217	Industrial shipment settings gain value	Approx. F92EH

(2) Reference table for user range settings offset/gain values (buffer memory addresses 218 to 233: Un\G218 to 233)

Example: When the offset value and gain value of channel 1 are 1V and 5V, respectively, in the Q68DAV, the reference value of the CH1 user range settings offset value (buffer memory address 218: Un\G218) is approx. 8CB4H and that of the CH1 user range settings gain value (buffer memory address 220: Un\G220) is approx. BFAEH.

Offset/gain value		Reference value (Hexadecimal)
Voltage	0V	Approx. 7FF8H
	1V	Approx. 8CB4H
	5V	Approx. BFAEH
	10V	Approx. FF5AH
Current	0mA	Approx. 7FF8H
	4mA	Approx. 983AH
	20mA	Approx. F92EH

7.5 Precautions for Online Module Change

The following are the precautions for online module change.

(1) Always perform an online module change in the correct procedure. A failure to do so can cause a malfunction or failure.

(2) If an online module change is made with the user range setting, the accuracy after that will fall to about less than three times of the accuracy before that. Re-set the offset/gain values as necessary.

8 TROUBLESHOOTING

This chapter explains the types of errors that may occur when the Q62DA, Q64DA, Q68DAV or Q68DAI is used, and how to troubleshoot such errors.

8.1 Error Code List

If an error occurs in Q62DA, Q64DA, Q68DAV or Q68DAI while writing to or reading data from the PLC CPU, the applicable error code is written to buffer memory address 19 (Un\G19).

Table 8.1 Error code list

Error code (decimal)	Error description	Processing
10□	The setting is outside the output range setting that can be made by the intelligent function module switch of the GX Developer. □ indicates the incorrectly specified channel number.	Reset to the correct parameter with GX Developer parameter setting. (See Section 4.5.)
111	Module error at startup.	Turn the power ON and OFF again. If the error occurs again, the module may be malfunctioning. Contact the nearest distributor or branch office with a description of the problem.
161 *1	The G.OGSTOR instruction was executed in the offset/gain setting mode.	Do not execute the G.OGSTOR instruction in the offset/gain setting mode.
162	• The G.OGSTOR instruction was executed consecutively. • At the time of offset/gain setting, a set value was written to the E^2PROM 26 or more times.	• Execute the G.OGSTOR instruction only once for one module. • At the time of offset/gain setting, write a set value only once at one time.
163	The G.OGSTOR instruction was executed for the model that differs from the model for which the G.OGLOAD instruction had been executed.	Execute the G.OGLOAD and G.OGSTOR instructions for the same model.
40□ *	The offset value is equal to or greater than the gain value at the time of user range setting or user range restoration. □ indicates the channel number causing the error.	Reset so that the offset value becomes smaller than the gain value.
500 *	More than one channel was set at the same time during offset/gain settings.	Set the correct value in buffer memory addresses 22 and 23 (Un\G22 and Un\G23).
60□ *	The specified digital value is outside the valid range. □ indicates the channel number where the error occurred.	Set a value that is within the valid range.
700 *	The analog adjustment output in the offset/gain setting mode is outside the specified value range.	Change the contents of buffer memory address 24 (Un\G24) so that it is within the range from –3000 to 3000.

*1: Not written to the buffer memory address 19 (Un\G19). Written to the completion status area (S)+1 of the G.OGSTOR instruction.

POINT

(1) If more than one error occurs, the error code first detected by the D/A converter module is stored. No other error codes will be stored.

(2) The error described with * can be cleared by setting the error clear request (YF) to ON.

(3) The error is cleared at the time of mode switching.

8.2 Troubleshooting

8.2.1 When the "RUN" LED is flashing or turned off

(1) When flashing

Check item	Corrective action
Is the mode set to the offset/gain setting mode?	Reset switch 4 of the intelligent function module setting for GX Developer to the normal mode (see Section 4.5).

(2) When off

Check item	Corrective action
Is power being supplied?	Confirm that the supply voltage for the power supply module is within the rated range.
Is the capacity of the power supply module adequate?	Calculate the current consumption of the CPU module, I/O module and intelligent function module mounted on the base unit to see if the power supply capacity is adequate.
Has a watchdog timer error occurred?	Reset the PLC CPU and verify that it is lit. If the RUN LED does not light even after doing this, the module may be malfunctioning. Contact the nearest distributor or branch office with a description of the problem.
Is the module correctly mounted on the base unit?	Check the mounting condition of the module.
Is a module change enabled during an online module change?	Refer to Chapter 7 and take corrective action.

8.2.2 When the "ERROR" LED is on or flashing

(1) When on

Check item	Corrective action
Is an error being generated?	Confirm the error code and take corrective action described in Section 8.1.

(2) When flashing

Check item	Corrective action
Is intelligent function module setting switch 5 set to "other than 0"?	Using GX Developer parameter setting, set intelligent function module setting switch 5 to "0" (see Section 4.5).

8.2.3 When an analog output value is not output

Check item	Action to be taken
Is 24VDC external power supply being supplied?	Verify that 24VDC voltage is being supplied to the external power supply terminals (Q62DA, Q64DA: terminal numbers 16, 17 Q68DAV, Q68DAI: terminal numbers 17, 18).
Is there any fault with the analog signal lines such as broken or disconnected line?	Check for any abnormality on the signal lines by doing a visual check and performing a continuity check.
Is the CPU module in the STOP status?	Set the CPU module to the RUN status.
Are the offset/gain settings correct?	Verify that the offset/gain settings are correct (see sections 4.6, 5.6.2 and 5.6.3). If the user range setting is being used, switch to a different default input range and check if D/A conversion is correctly performed. If it is correctly performed, redo the offset/gain settings.
Is the output setting range correct?	Verify buffer memory address 20 and 21 (Un\G20 and Un\G21) in GX Developer monitor. If the output range setting is incorrect, redo GX Developer intelligent function module switch settings (see Section 4.5).
Is the resolution mode setting correct?	Check the ON/OFF status of the high resolution mode status flag (X8) in GX Developer system monitor. If the resolution mode setting is incorrect, redo the GX Developer intelligent function module switch setting. (See Section 4.5.)
Is the D/A conversion enable/disable setting for the channel to be output set to Disable?	Check the D/A conversion enable/disable setting using buffer memory 0 (Un\G0) in GX Developer monitor and set it to Enable using the sequence program or utility package (see Section 3.4).
Is the D/A output enable/disable setting for the channel to be output set to Disable?	Verify ON/OFF for the output enable/disable flags (Y1 to Y8) in GX Developer monitor. If the output enable/disable flags are OFF, review the initial setting for the sequence program or utility package (see Section 3.3).
Is the digital value being written to the channel to be output?	Verify buffer memory addresses 1 to 8 (Un\G1 to Un\G8) in GX Developer monitor (see Section 3.4).
Has the operating condition setting request (Y9) been executed?	Set the operating condition setting request (Y9) from ON to OFF from GX Developer and check to see if the analog output is normal. If normal analog output is obtained, review the initial setting for the sequence program or utility package (see Section 3.3).

POINT

If the analog output value is not output after the proper corrective action is taken in accordance with the above check item, the possible cause is a module failure. Consult the nearest sales representative or branch.

8.2.4 Checking the D/A converter module status using GX Developer system monitor

When the D/A converter module detail information is selected in GX Developer system monitor, function version, error code, LED ON status and status of the intelligent function module switch setting can be checked.

(1) Operating the GX Developer

[Diagnostics] → [System monitor] → "Select D/A converter module" → Module's Detailed Information

(2) Module Detailed Information

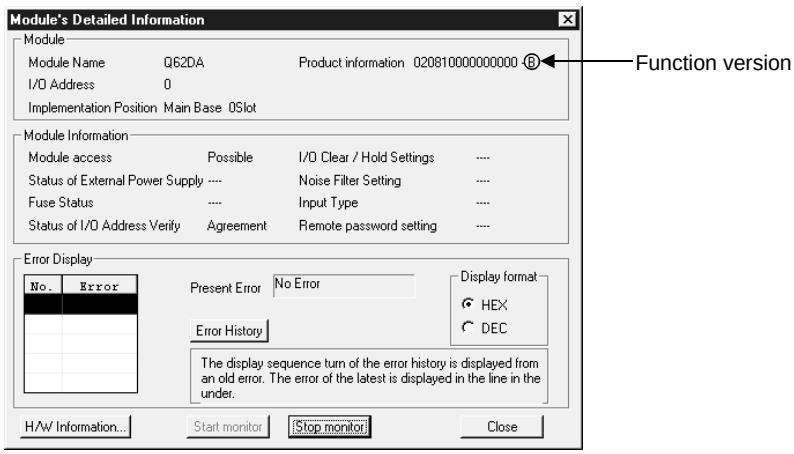
(a) Checking the function version

The function version of the D/A converter module is displayed in the product information field.

(b) Checking the error code

The error code stored in buffer memory address 19 (Un\G19) of the D/A converter module is displayed in the Present Error field.

(When the Error History button is pressed, the contents displayed in the Present Error field are displayed in the No.1 field.)



(3) H/W information

(a) H/W LED information

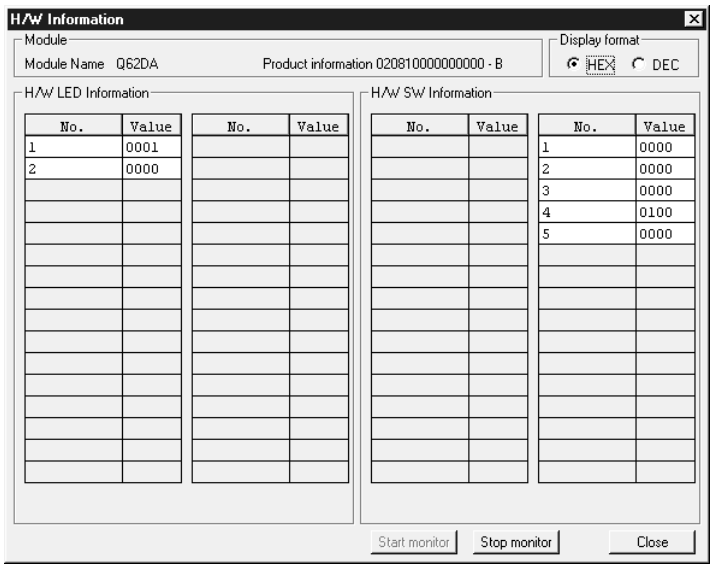
The LED status is displayed.

No.	LED name	Status
1	RUN LED	0000_H : Indicates that LED is unlit.
2	ERROR LED	0001_H : Indicates that LED is lit

(b) H/W SW information

The status of the intelligent function module switch setting is displayed.

No.	Switch setting for intelligent function module
1	Switch 1
2	Switch 2
3	Switch 3
4	Switch 4
5	Switch 5



APPENDIX

Appendix 1 Function upgrade for the D/A converter module

The D/A converter modules of function versions B and C have more functions than the conventional model (function version A).
This section describes a comparison of functions of the D/A converter module based on the function additions, combinations with GX Configurator-DA software version and precautions when replacing the module.

Appendix 1.1 A comparison of functions of the D/A converter module

The following table indicates the functions supported by the corresponding function versions.

Function		Function version A	Function version B	Function version C
D/A conversion enable/disable function		○	○	○
D/A output enable/disable function		○	○	○
Synchronous output function		○	○	○
Multiple PLC system compatibility		×	○	○
Analog output test during PLC CPU STOP		×	○	○
Resolution mode		—	—	—
	Normal resolution mode	○	○	○
	High resolution mode	×	○	○
High resolution mode status flag (X8)		×	○	○
Online module change		×	×	○
Switching between normal mode and offset/gain setting mode		—	—	—
	Dedicated instruction (G.OFFGAN)	×	×	○
	Buffer memory (mode switching setting) and Operation Condition Setting Request (Y9)	×	×	○
	GX Configurator-DA	×	×	○
	Intelligent function module switch setting	○	○	○

○ : Compatible × : Not compatible

Appendix 1.2 Combinations of D/A converter module functions and GX Configurator-DA software versions

The following table indicates the D/A converter module functions and corresponding GX Configurator-DA software versions.

Function	Software version			
	SW0D5C-QDAU-E 00A	SW0D5C-QDAU-E 10B	GX Configurator-DA Version 1.10L to 1.15R	GX Configurator-DA Version 1.16S or later
Normal resolution mode	○	○	○	○
High resolution mode ＊1	×	×	○	○
High resolution mode status flag (X8) ＊1 ＊2	×	×	○	○
Multiple PLC system compatibility ＊1	×	×	○	○
Analog output test during PLC CPU STOP ＊1	○	○	○	○
Normal mode - offset/gain setting mode switching ＊3	×	×	×	○

○ : Compatible × : Not compatible

＊1 Functions added by function version B.
＊2 When the D/A converter module is function version A and the GX Configurator-DA software version is SW0D5C-QDAU-E 20C or later or GX Configurator-DA Version 1.10L or later, OFF is always displayed.
＊3 Functions added by function version C.

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Appendix 1.3 Precautions for replacing the module of function version A with the one of function version B or later

(1) Incorporation into an existing system

You can use the wiring designed for function version A as-is to mount the D/A converter module of function version B or later.

(2) Program utilization

You can use the program created for function version A as-is with the D/A converter module of function version B or later.

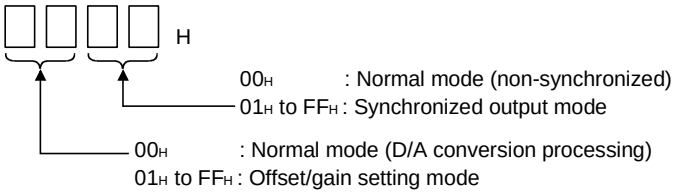
(3) Switch setting for Intelligent function module

The setting of the offset/gain setting mode differs between function versions A and B or later.

Perform the offset/gain settings after checking the RUN LED flashes in offset/gain setting mode. If the RUN LED does not flash, check to see if the switch 4 setting is correct.

(Refer to Section 4.5 for the intelligent function module switch setting of function version B or later.)

<Contents of switch 4 setting for function version A>



(4) Analog output during PLC CPU STOP

If the CH□ output enable/disable flag (Y1 to Y8) is forced ON (enabled) in the function version B D/A converter module, the D/A converted value may be output in some cases.

See Section 3.2.3 for details.

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Appendix 2 Dedicated Instruction List

The following table lists the dedicated instructions that can be used with the D/A converter modules.

Instruction	Description	Reference section
G.OFFGAN	Switches to the offset/gain setting mode. Switches to the normal mode.	Appendix 2.1
G.OGLOAD	Reads the offset/gain values of the user range setting to the CPU.	Appendix 2.2
G.OGSTOR	Restores the offset/gain values of the user range setting stored in the CPU to the D/A converter module.	Appendix 2.3

POINT

When the module is mounted to a MELSECNET/H remote station, the dedicated instructions cannot be used.

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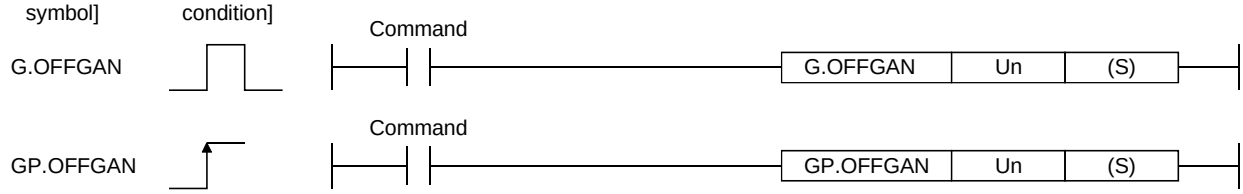
Appendix 2.1 OFFGAN

Switches the mode of the D/A converter module. (Normal mode to offset/gain setting mode, offset/gain setting mode to normal mode)

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□\□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○		—				—	—	—

[Instruction symbol] [Execution condition]



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S)	Mode switching 0: Switching to normal mode 1: Switching to offset/gain setting mode The setting of any other value results in "switching to offset/gain setting mode".	0 ,1	Binary 16 bits

(1) Function

Switches the mode of the D/A converter module.

- Normal mode to offset/gain setting mode (the offset/gain setting mode status flag (XA) turns ON)
- Offset/gain setting mode to normal mode (the offset/gain setting mode status flag (XA) turns OFF)

POINT

(1) When the offset/gain setting mode is switched to the normal mode, Module Ready (X0) turns from OFF to ON.
Note that initial setting processing will be executed if there is a sequence program that makes initial setting when Module Ready (X0) turns ON.

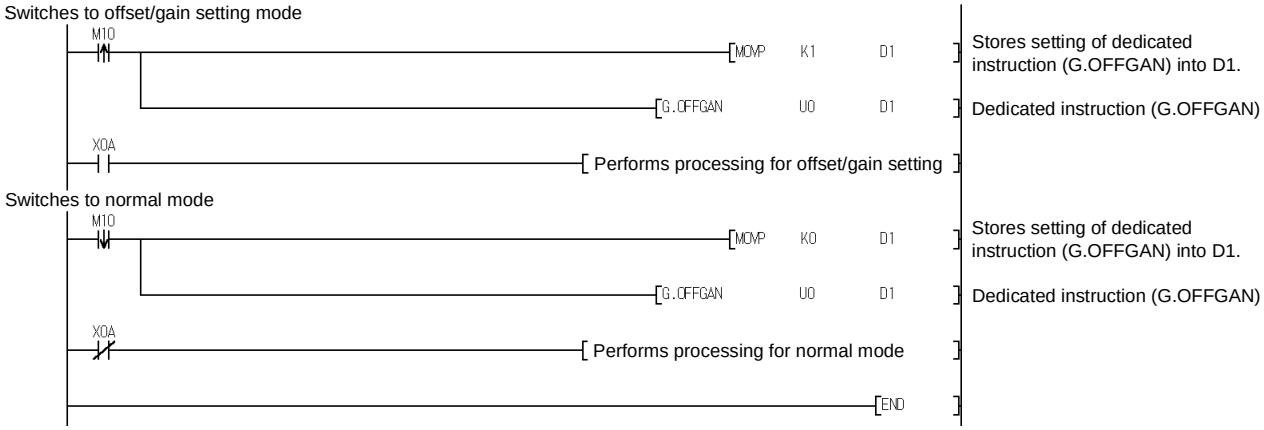
(2) D/A conversion is discontinued if the mode is switched (from the normal mode to the offset/gain setting mode or from the offset/gain setting mode to the normal mode).
To resume D/A conversion, switch to the normal mode and then turn ON Operating condition setting request (Y9).

(2) Operation error

No errors.

(3) Program example

The following program is designed to switch the D/A converter module mounted in the position of I/O number X/Y0 to X/YF to the offset/gain setting mode when M10 is turned ON, and to return it to the normal mode when M10 is turned OFF.



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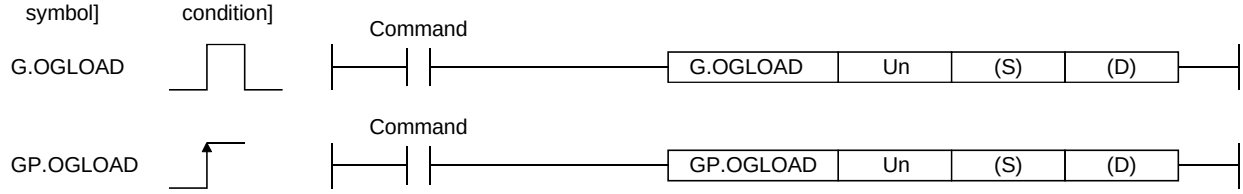
Appendix 2.2 OGLOAD

Reads the offset/gain values of the user range setting of the D/A converter module to the CPU.

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□\□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○		—				—	—	—
(D)	○			—				—	—	—

[Instruction symbol] [Execution condition]



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S)	Start number of the device in which control data is stored.	Within the range of the specified device	Device name
(D)	Device that is turned ON 1 scan on completion of dedicated instruction processing. (D) + 1 also turns ON at an abnormal completion.	Within the range of the specified device	Bit

Control data *1 of Q62DA

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2	Pass data classification setting	Specify the voltage/current of the offset/gain values to be read. 0: Voltage specified 1: Current specified b15 … b2 b1 b0 0 ~ 0 CH.2 CH.1	0000H to 000FH	User
(S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH1 User range settings offset value	—	—	System
(S) + 9	CH1 User range settings gain value	—	—	System
(S) + 10	CH2 User range settings offset value	—	—	System
(S) + 11	CH2 User range settings gain value	—	—	System

*1 Set only the pass data classification setting (S)+2. If data is written to the area set by the system, the offset/gain values will not be read properly.

Control data *2 of Q64DA

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2	Pass data classification setting	Specify the voltage/current of the offset/gain values to be read. 0: Voltage specified 1: Current specified b15 … b4 b3 b2 b1 b0 0 ~ 0 CH.4 CH.3 CH.2 CH.1	0000H to 000FH	User
(S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH1 User range settings offset value	—	—	System
(S) + 13	CH1 User range settings gain value	—	—	System
(S) + 14	CH2 User range settings offset value	—	—	System
(S) + 15	CH2 User range settings gain value	—	—	System
(S) + 16	CH3 User range settings offset value	—	—	System
(S) + 17	CH3 User range settings gain value	—	—	System
(S) + 18	CH4 User range settings offset value	—	—	System
(S) + 19	CH4 User range settings gain value	—	—	System

*2 Set only the pass data classification setting (S)+2. If data is written to the area set by the system, the offset/gain values will not be read properly.

Control data *3 of Q68DAV

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2 (S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH5 Industrial shipment settings offset value	—	—	System
(S) + 13	CH5 Industrial shipment settings gain value	—	—	System
(S) + 14	CH6 Industrial shipment settings offset value	—	—	System
(S) + 15	CH6 Industrial shipment settings gain value	—	—	System
(S) + 16	CH7 Industrial shipment settings offset value	—	—	System
(S) + 17	CH7 Industrial shipment settings gain value	—	—	System
(S) + 18	CH8 Industrial shipment settings offset value	—	—	System
(S) + 19	CH8 Industrial shipment settings gain value	—	—	System
(S) + 20	CH1 User range settings offset value	—	—	System
(S) + 21	CH1 User range settings gain value	—	—	System
(S) + 22	CH2 User range settings offset value	—	—	System
(S) + 23	CH2 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings offset value	—	—	System
(S) + 25	CH3 User range settings gain value	—	—	System
(S) + 26	CH4 User range settings offset value	—	—	System
(S) + 27	CH4 User range settings gain value	—	—	System
(S) + 28	CH5 User range settings offset value	—	—	System
(S) + 29	CH5 User range settings gain value	—	—	System
(S) + 30	CH6 User range settings offset value	—	—	System
(S) + 31	CH6 User range settings gain value	—	—	System
(S) + 32	CH7 User range settings offset value	—	—	System
(S) + 33	CH7 User range settings gain value	—	—	System
(S) + 34	CH8 User range settings offset value	—	—	System
(S) + 35	CH8 User range settings gain value	—	—	System

*3 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

Control data *4 of Q68DAI

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2 (S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH5 Industrial shipment settings offset value	—	—	System
(S) + 13	CH5 Industrial shipment settings gain value	—	—	System
(S) + 14	CH6 Industrial shipment settings offset value	—	—	System
(S) + 15	CH6 Industrial shipment settings gain value	—	—	System
(S) + 16	CH7 Industrial shipment settings offset value	—	—	System
(S) + 17	CH7 Industrial shipment settings gain value	—	—	System
(S) + 18	CH8 Industrial shipment settings offset value	—	—	System
(S) + 19	CH8 Industrial shipment settings gain value	—	—	System
(S) + 20	CH1 User range settings offset value	—	—	System
(S) + 21	CH1 User range settings gain value	—	—	System
(S) + 22	CH2 User range settings offset value	—	—	System
(S) + 23	CH2 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings offset value	—	—	System
(S) + 25	CH3 User range settings gain value	—	—	System
(S) + 26	CH4 User range settings offset value	—	—	System
(S) + 27	CH4 User range settings gain value	—	—	System
(S) + 28	CH5 User range settings offset value	—	—	System
(S) + 29	CH5 User range settings gain value	—	—	System
(S) + 30	CH6 User range settings offset value	—	—	System
(S) + 31	CH6 User range settings gain value	—	—	System
(S) + 32	CH7 User range settings offset value	—	—	System
(S) + 33	CH7 User range settings gain value	—	—	System
(S) + 34	CH8 User range settings offset value	—	—	System
(S) + 35	CH8 User range settings gain value	—	—	System

*4 Setting is not necessary. If setting is made, the offset/gain values will not be read properly.

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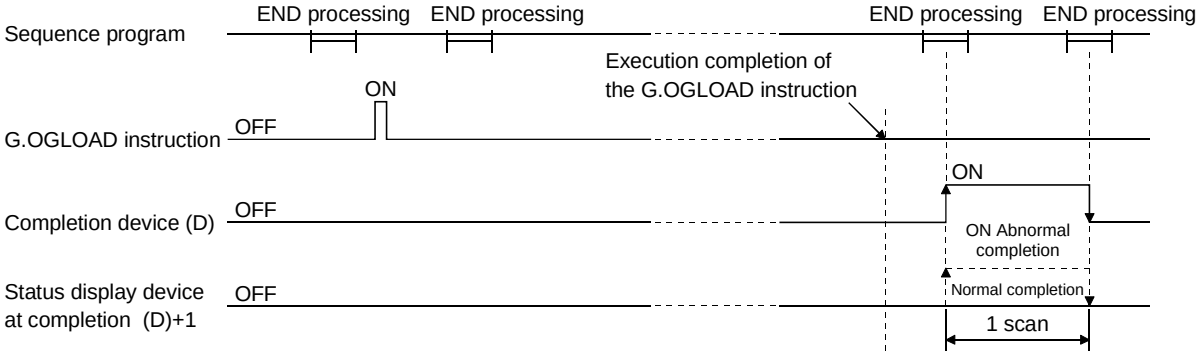
(1) Functions

(a) Reads the offset/gain values of the user range setting of the D/A converter module to the CPU.

(b) There are two types of interlock signals for the G.OGLOAD instruction: the completion device (D) and the status display device at completion (D) + 1.

1) Completion device
Turns ON in the END processing of the scan where the G.OGLOAD instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion
Turns ON and OFF depending on the completion status of the G.OGLOAD instruction.
Normal completion : Stays OFF and does not change.
Abnormal completion: Turns ON in the END processing of the scan where the G.OGLOAD instruction is completed, and turns OFF in the next END processing.

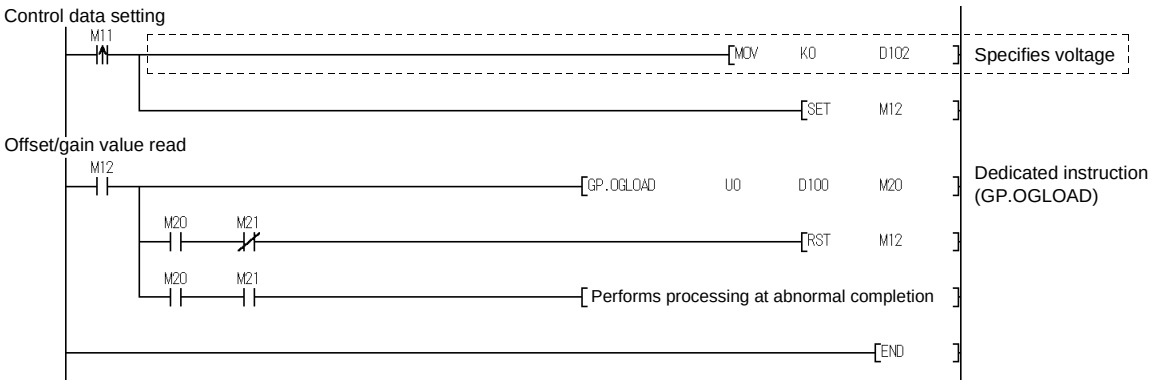


(2) Operation error

No errors.

(3) Program example

The following program is designed to read the offset/gain values of the D/A converter module mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



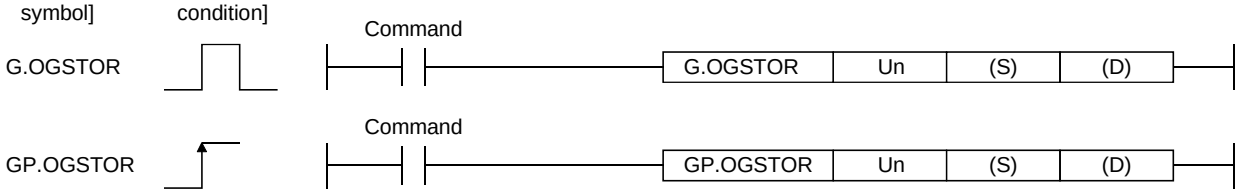
∗ For the Q68DAV/Q68DAI, the program in the dotted area is not necessary.

Appendix 2.3 OGSTOR

Restores the offset/gain values of the user range setting stored in the CPU to the D/A converter module.

Set data	Usable devices									
	Internal device (System, user)		File register	MELSECNET/H Direct J□\□		Special function module U□\G□	Index register Z□	Constant		Other
	Bit	Word		Bit	Word			K, H	S	
(S)	—	○		—				—	—	—
(D)	○			—				—	—	—

[Instruction symbol] [Execution condition]



Set data

Device	Description	Setting range	Data type
Un	Start I/O number of the module	0 to FEH	Binary 16 bits
(S) ∗1	Start number of the device in which control data is stored.	Within the range of the specified device	Device name
(D)	Device that is turned ON 1 scan on completion of dedicated instruction processing. (D) + 1 also turns ON at an abnormal completion.	Within the range of the specified device	Bit

∗1 When executing the G.OGLOAD instruction, specify the device designated in (S).
Do not change the data read with the G.OGLOAD instruction.
If it is changed, normal operation cannot be guaranteed.

Control data of Q62DA

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2	Pass data classification setting	The value set to Pass data classification setting (S)+2 using the G.OGLOAD instruction is stored. 0: Voltage specified 1: Current specified b15 ~ b2 b1 b0 0 ~ 0 CH.2 CH.1	0000H to 000FH	User
(S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH1 User range settings offset value	—	—	System
(S) + 9	CH1 User range settings gain value	—	—	System
(S) + 10	CH2 User range settings offset value	—	—	System
(S) + 11	CH2 User range settings gain value	—	—	System

Control data of Q64DA

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2	Pass data classification setting	The value set to Pass data classification setting (S)+2 using the G.OGLOAD instruction is stored. 0: Voltage specified 1: Current specified b15 ~ b4 b3 b2 b1 b0 0 ~ 0 CH.4 CH.3 CH.2 CH.1	0000_H to $000F_H$	User
(S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH1 User range settings offset value	—	—	System
(S) + 13	CH1 User range settings gain value	—	—	System
(S) + 14	CH2 User range settings offset value	—	—	System
(S) + 15	CH2 User range settings gain value	—	—	System
(S) + 16	CH3 User range settings offset value	—	—	System
(S) + 17	CH3 User range settings gain value	—	—	System
(S) + 18	CH4 User range settings offset value	—	—	System
(S) + 19	CH4 User range settings gain value	—	—	System

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Control data of Q68DAV

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2 (S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH5 Industrial shipment settings offset value	—	—	System
(S) + 13	CH5 Industrial shipment settings gain value	—	—	System
(S) + 14	CH6 Industrial shipment settings offset value	—	—	System
(S) + 15	CH6 Industrial shipment settings gain value	—	—	System
(S) + 16	CH7 Industrial shipment settings offset value	—	—	System
(S) + 17	CH7 Industrial shipment settings gain value	—	—	System
(S) + 18	CH8 Industrial shipment settings offset value	—	—	System
(S) + 19	CH8 Industrial shipment settings gain value	—	—	System
(S) + 20	CH1 User range settings offset value	—	—	System
(S) + 21	CH1 User range settings gain value	—	—	System
(S) + 22	CH2 User range settings offset value	—	—	System
(S) + 23	CH2 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings offset value	—	—	System
(S) + 25	CH3 User range settings gain value	—	—	System
(S) + 26	CH4 User range settings offset value	—	—	System
(S) + 27	CH4 User range settings gain value	—	—	System
(S) + 28	CH5 User range settings offset value	—	—	System
(S) + 29	CH5 User range settings gain value	—	—	System
(S) + 30	CH6 User range settings offset value	—	—	System
(S) + 31	CH6 User range settings gain value	—	—	System
(S) + 32	CH7 User range settings offset value	—	—	System
(S) + 33	CH7 User range settings gain value	—	—	System
(S) + 34	CH8 User range settings offset value	—	—	System
(S) + 35	CH8 User range settings gain value	—	—	System

Control data of Q68DAI

Device	Item	Set data	Setting range	Set by
(S)	System area	—	—	—
(S) + 1	Completion status	Stores the status when the instruction is complete. 0 : Normal completion Other than 0: Abnormal completion	—	System
(S) + 2 (S) + 3	System area	—	—	—
(S) + 4	CH1 Industrial shipment settings offset value	—	—	System
(S) + 5	CH1 Industrial shipment settings gain value	—	—	System
(S) + 6	CH2 Industrial shipment settings offset value	—	—	System
(S) + 7	CH2 Industrial shipment settings gain value	—	—	System
(S) + 8	CH3 Industrial shipment settings offset value	—	—	System
(S) + 9	CH3 Industrial shipment settings gain value	—	—	System
(S) + 10	CH4 Industrial shipment settings offset value	—	—	System
(S) + 11	CH4 Industrial shipment settings gain value	—	—	System
(S) + 12	CH5 Industrial shipment settings offset value	—	—	System
(S) + 13	CH5 Industrial shipment settings gain value	—	—	System
(S) + 14	CH6 Industrial shipment settings offset value	—	—	System
(S) + 15	CH6 Industrial shipment settings gain value	—	—	System
(S) + 16	CH7 Industrial shipment settings offset value	—	—	System
(S) + 17	CH7 Industrial shipment settings gain value	—	—	System
(S) + 18	CH8 Industrial shipment settings offset value	—	—	System
(S) + 19	CH8 Industrial shipment settings gain value	—	—	System
(S) + 20	CH1 User range settings offset value	—	—	System
(S) + 21	CH1 User range settings gain value	—	—	System
(S) + 22	CH2 User range settings offset value	—	—	System
(S) + 23	CH2 User range settings gain value	—	—	System
(S) + 24	CH3 User range settings offset value	—	—	System
(S) + 25	CH3 User range settings gain value	—	—	System
(S) + 26	CH4 User range settings offset value	—	—	System
(S) + 27	CH4 User range settings gain value	—	—	System
(S) + 28	CH5 User range settings offset value	—	—	System
(S) + 29	CH5 User range settings gain value	—	—	System
(S) + 30	CH6 User range settings offset value	—	—	System
(S) + 31	CH6 User range settings gain value	—	—	System
(S) + 32	CH7 User range settings offset value	—	—	System
(S) + 33	CH7 User range settings gain value	—	—	System
(S) + 34	CH8 User range settings offset value	—	—	System
(S) + 35	CH8 User range settings gain value	—	—	System

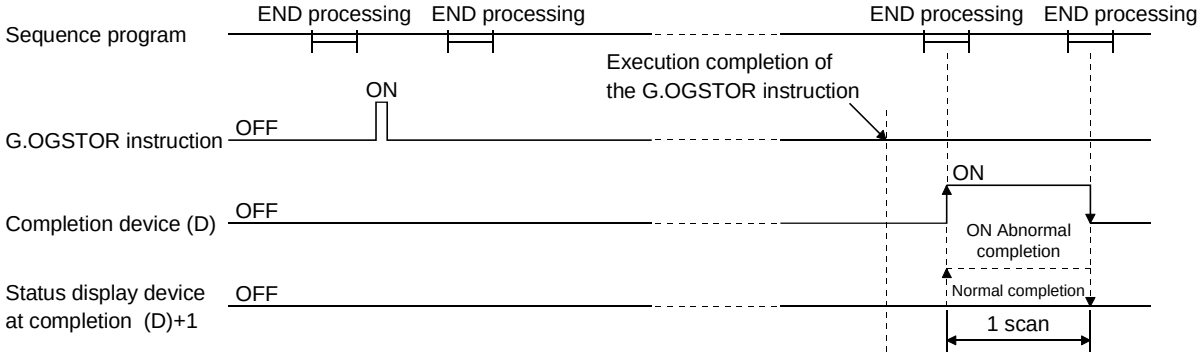
(1) Functions

(a) Restores the offset/gain values of the user range setting stored in the CPU to the D/A converter module.

(b) There are two types of interlock signals for the G.OGSTOR instruction: the completion device (D) and the status display device at completion (D) + 1.

1) Completion device
Turns ON in the END processing of the scan where the G.OGSTOR instruction is completed, and turns OFF in the next END processing.

2) Status display device at completion
Turns ON and OFF depending on the completion status of the G.OGSTOR instruction.
Normal completion : Stays OFF and does not change.
Abnormal completion: Turns ON in the END processing of the scan where the G.OGSTOR instruction is completed, and turns OFF in the next END processing.



(c) When the offset/gain values are restored, the reference accuracy falls to less than ±0.15%.

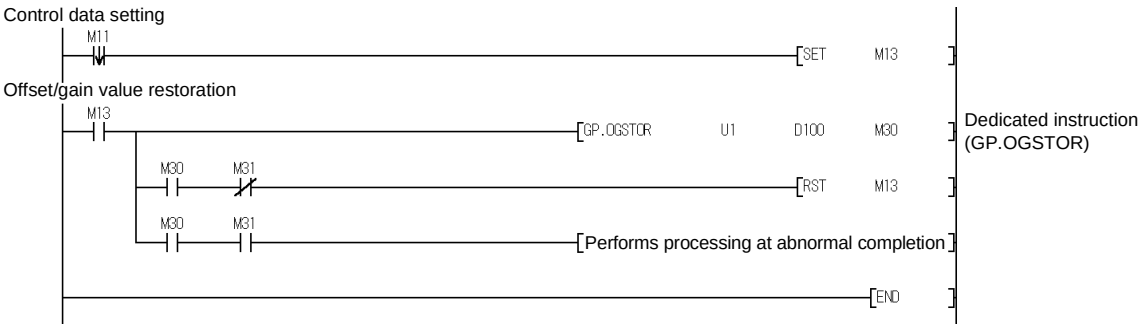
(2) Operation error

In any of the following cases, an error occurs and the corresponding error code is stored into the completion status area (S)+1.

Error code	Case resulting in operation error
161	The G.OGSTOR instruction was executed in the offset/gain setting mode.
162	The G.OGSTOR instruction was executed consecutively.
163	The G.OGSTOR instruction was executed for the model that differs from the model for which the G.OGLOAD instruction had been executed.

(3) Program example

The following program is designed to read the offset/gain values of the D/A converter module mounted in the position of I/O number X/Y0 to X/YF when M11 is turned ON.



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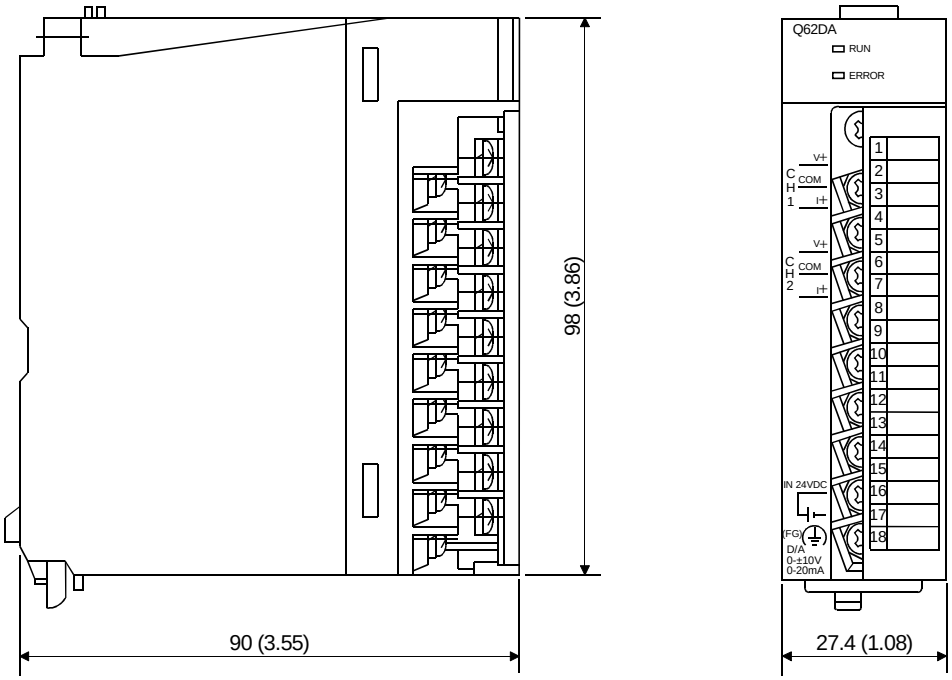
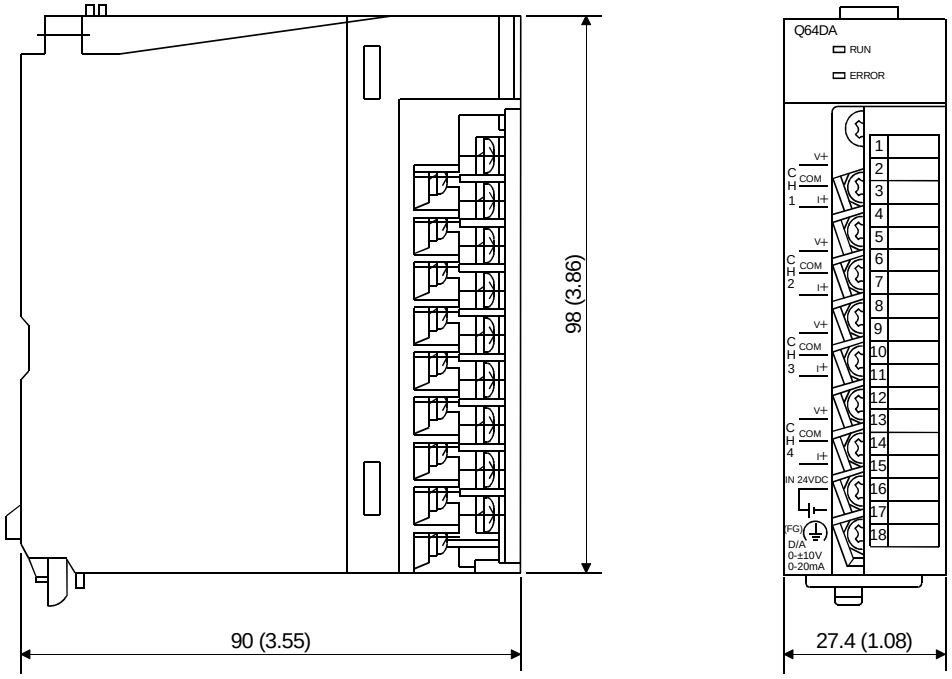
Appendix 3 External Dimension Diagram

(1) Q62DA



(2) Q64DA



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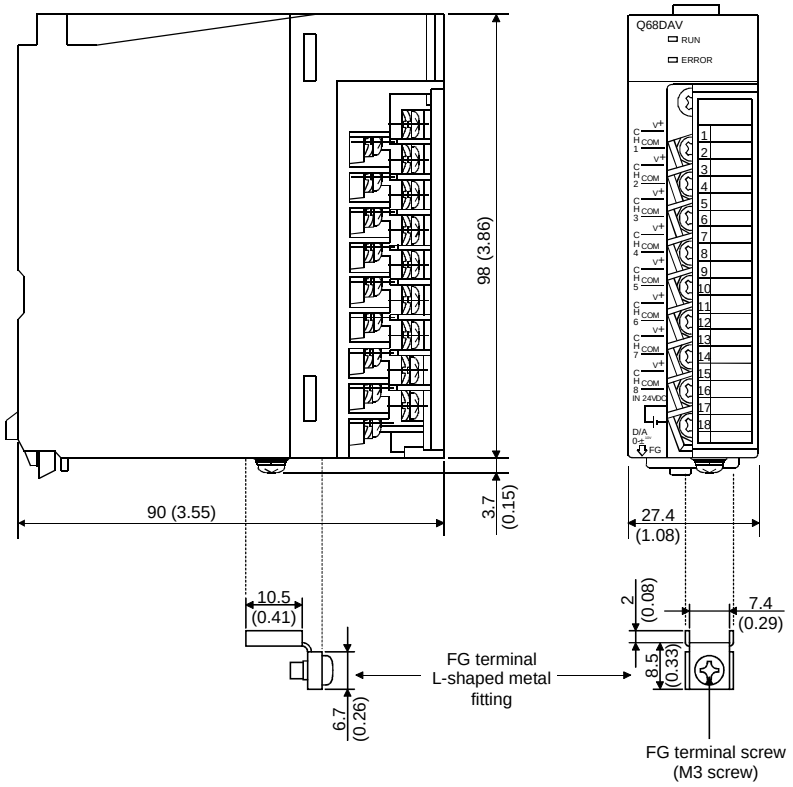
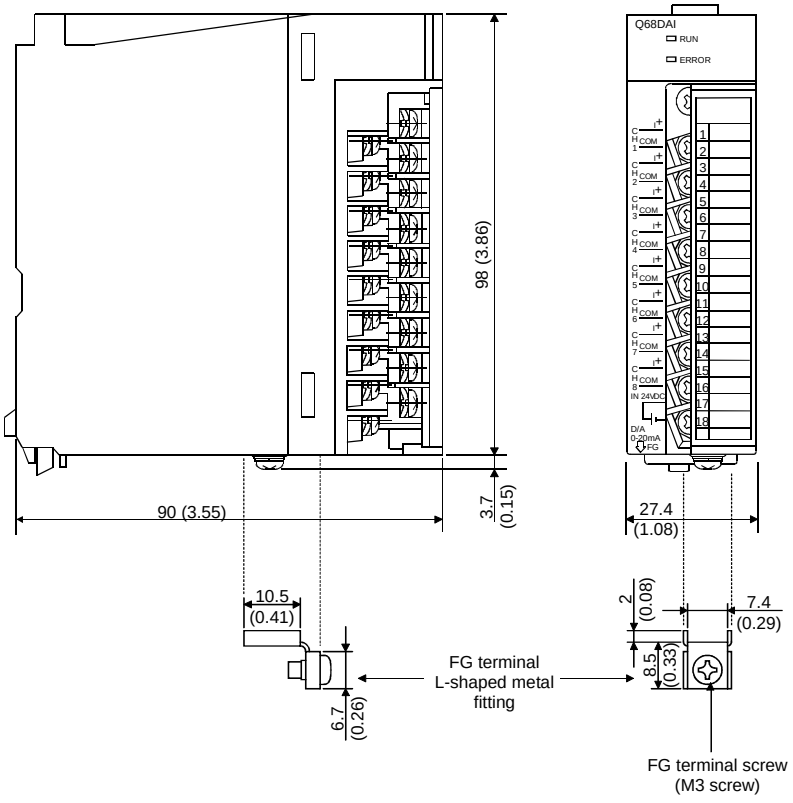
(3) Q68DAV



(4) Q68DAI



MEMO

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WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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Digital-Analog Converter Module

User's Manual

MODEL	Q-D/A-U-S-E
MODEL CODE	13JR02
SH(NA)-080054-H(0305)MEE	

MITSUBISHI ELECTRIC CORPORATION

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